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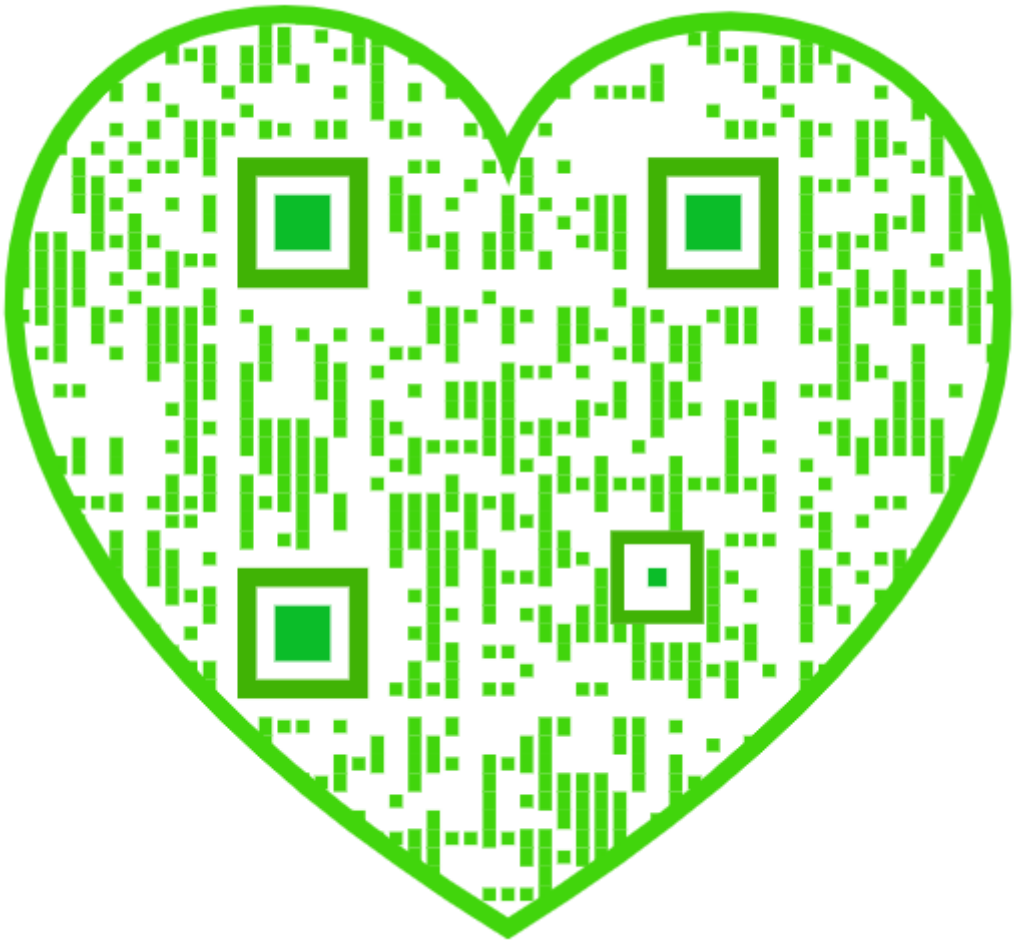

Scientific American.

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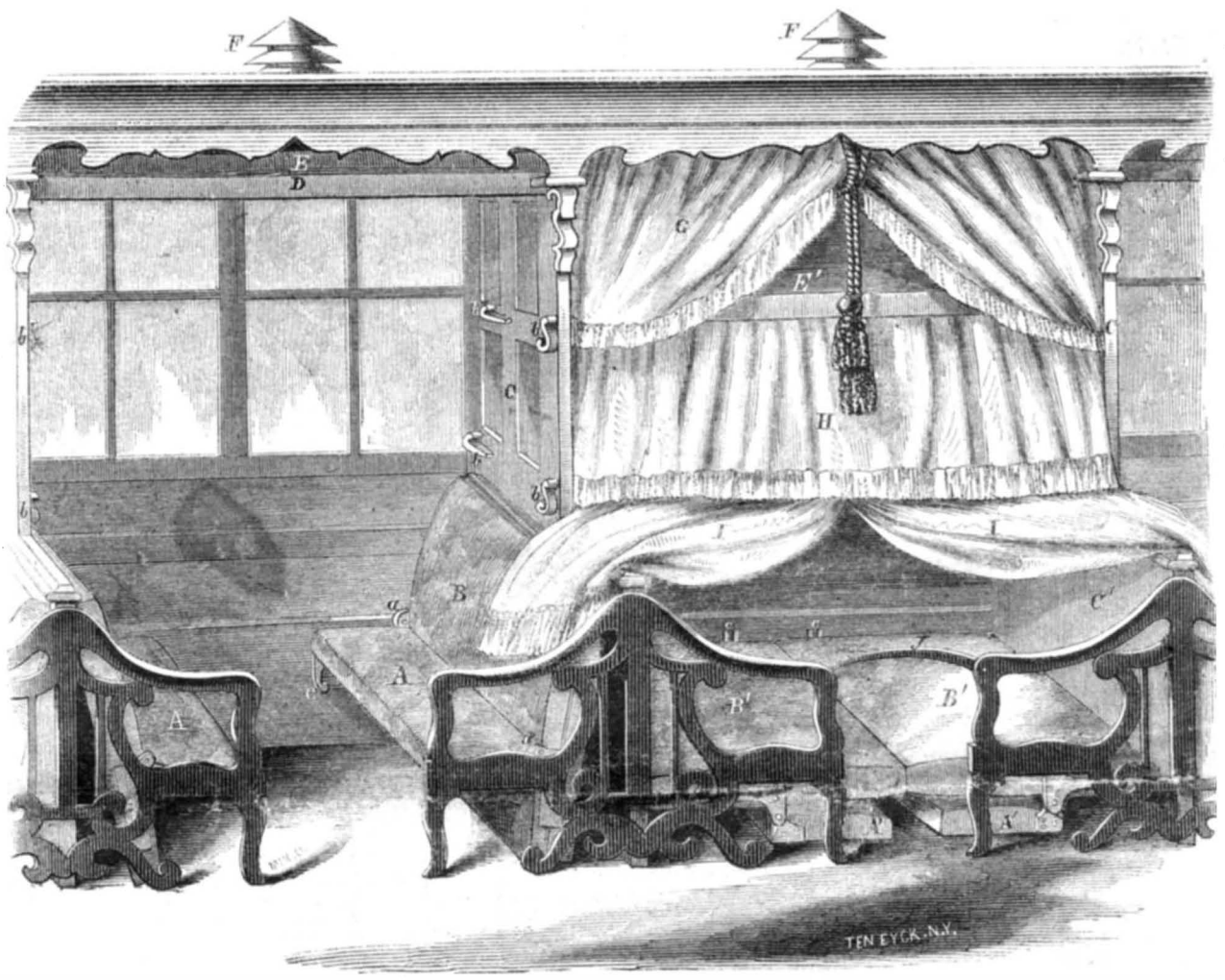
Hardening Metal.

Steel possesses the property of becoming much harder by being highly heated, and then suddenly cooled, which process is called *tempering*. Different qualities of steel are not affected precisely alike by the same process; one requires a much higher heat than another, and the degree of hardness which is finally obtained depends both upon the temperature to which it is exposed, and the coldness of the medium in which it is cooled. It requires considerable experience to become acquainted with the different qualities of steel, and the particular degree of heat to which each should be raised to give it the proper temper. One practical test is to draw a bar of steel belonging to a certain lot, or brand, to a tapered point, such as a chisel, and then temper it. The tapered point will thus be variously affected according to its thickness, and by breaking off pieces from the point inwards, the character of the grain will show the effects of the difference of temperature which has been applied, the finest grain being considered the best.

As various cooling mediums produce different qualities of temper, cold water, oil baths, and cold soap suds are employed. Steel which is required to be very hard, such as files, are plunged into a salt brine, which is colder than pure water; most tools, however, are tempered in water, In tempering large masses of steel, such as anvils, rollers, or dies, they should be heated to a low red color, and cold water applied so as to strike their whole surface evenly, and then flow off freely, which prevents them from cracking. Any degree of hardness may be imparted to steel by first tempering, then annealing it. This latter process consists in reheating the steel after it is polished, until it assumes a peculiar color, which is an index of its hardness. The gradations of these colors are light yellow or straw, violet, blue, slate, and finally black, which latter is the softest, and about the same degree as that of the steel before it was hardened, Various tools would be too inflexible, and devoid of spring, were they not annealed. Some are annealed by a temperature at which tallow or oil burns, hence their surfaces are rubbed over with oil, and then flamed in a fire, when they become elastic.

A number of theories have been advanced respecting the changes produced in the character of steel by tempering, but none of them are satisfactory. The metal undergoes no change in its composition by the process; its molecules only assume a different arrangement. In volume XII. of the SCIENTIFIC AMERICAN, a considerable amount of useful information was presented on the tempering of mill-picks, but since that period several inquiries have been made for more general information on the subject.

CASE'S RAILROAD SLEEPING CAR.



We were much pleased the other day, while taking a trip by rail, to observe at the roadside stations, that, as an additional attraction to several Western roads, it was announced that "sleeping cars" accompanied each night train. This shows that their value and comfort are appreciated, and that they are gradually coming into general use. We have therefore no hesitation in presenting to our readers all the various inventions which have been produced to supply the railroad companies and the public with a convenient and comfortable sleeping car.

Our present illustration shows the invention of Sidney C. Case, of Detroit, Mich., with one compartment arranged for day, and the other for night use. In both of these the seats, A, are hinged to their backs, B, at *a*; the backs, B, being also hinged to the side rails or arms and sides of the car, so that they can fold down as seen at A′, B′. These folded down form berths for two. The divisions between the compartments, C, are provided with small rests or supports. *b*, so arranged that the supplemental berths, D E, in the daytime placed in the top of the car out of the way, can be readily placed in their respective positions by turning them down and can be supported in the grooves by small pins projecting from the ends of the supplemental berths. Each of these berths, D and E, hold one person, thus making a compartment hold as many persons lying down, as in a sitting position.

Ventilators, F, are placed in each compartment to keep up a proper circulation of air, so necessary when sleeping. throughout the car and berths.

Near the roof of the car the curtains, G, are attached, which completely conceal the occupant of the top berth, and this has curtains, H, attached, that in like manner conceal the occupant of the next single berth, while it has curtains, I, that pass over the hand rails or arms, and cover the occupants of the lower berths. To the bottom or underside of the top berth groove, supports are secured, in which the lower single berth can be supported, when they are placed out of the way in the top of the car, in which position the curtains fold in with them and are kept out of the way. There is room between the backs, B, and the division of the compartments, C′, for the pillows; the bedding is placed under the seats, and an arm, J, extends across the arms, to afford a support for the curtains, I, when thrown over the occupants. The seats, A, are supported by pieces, *c*, in the arms and sides, from which, however, they can be readily detached when a bed is to be formed. The change from a sitting to a sleeping car can be easily and quickly made by the passengers themselves, to accommodate either one, two, three, or four persons.

It was patented June 22, 1858, and any further particulars can be obtained by addressing the inventor of this, a most excellent arrangement, as above.

Superheated Steam and Cylinder Jackets.

In the recent address of J. Macquorn Rankine, C. E., F. R., S., delivered before the Institution of Engineers in Scotland, we find some exceedingly practical and useful information on this subject. He states that in the working of expansive condensing steam engines, in order to obtain the economy properly due to expansion, means should be taken, by the use of steam jackets, or some other mode, to prevent that condensation which always takes place in saturated steam, when it performs work by expansion, and is not supplied by heat from some external source. The water condensed in an expansive working cylinder cools the steam at the beginning of the stroke, lowers the initial pressure, and injures the vacuum so as to reduce the work of the engine below that which is properly due to expansion, and to make it approximate to that of a full pressure engine working at some pressure intermediate below that of the exhaust. By the use of a steam jacket the condensation of a certain quantity of steam is not prevented, but instead of this taking place in the cylinder, it is effected in the jacket where the condensed water does no injury. Besides the proper management of the expansive working of steam there is another means of improving the economy of power in the cylinder of the engine, namely, by using steam heated to a temperature above the boiling point at which it was generated ("superheated steam"). The efficiency of any engine is as the difference between the temperature at which the steam performs its work and that temperature at which the steam is condensed. The use of "superheated steam" enables work to be performed at a high temperature without producing a dangerous pressure.

Sugar in Louisiana.

The New Orleans (La.) *Delta* says:—Sugar is twenty thousand hogsheads and molasses twenty thousand barrels ahead of last year. We do not think it extravagant to say that the aggregate value of the receipts of the products of the valley of the Mississippi at this port, up to the present period, is double that for the same period last year.

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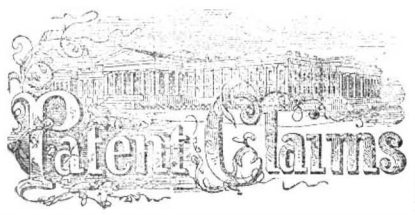

Issued from the United States Patent Office

FOR THE WEEK ENDING DECEMBER 21, 1858.

[*Reported officially for the Scientific American.*]

*** Circulars giving full particulars of the mode of applying for patents, size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

MODE OF CLEANING RICE—Wilson Ager, of Rohrsburg, Pa. : I am aware that air has been injected into masses of grain by perforation tubes and otherwise, for the purpose of cooling the grain and preventing fermentation. To such I make no claim.

But what I claim as an improvement in the mode of cleaning rice is, the forcing of a current of air into or through the grain during the cleaning operation for the purpose set forth.

CAR SEATS AND COUCHES—Horace L. Arnold, of Elk Horn, Wis. : I claim, first, Jointing the ends of the seats, next the sides of the car to a stud or bolt, B, so as to enable them to be arranged to right angles to the sides of the car, or to be swung round or turned to a diagonal position, and to thus occupy the spaces between them longitudinally and increase the width of the passage-way, and thus admit of their elongation to convert them into distinct sleeping berths or couches, as set forth.

Second, I claim the combination of the slotted bar, F', eccentric lever clamp, H, and plates, I K, with lips or raised edges for firmly fastening the seats in the required position to answer their designs, as described.

Third, I also claim the combination of the slides, O, or their equivalents, and the T-shaped bars, M M', for sustaining the backs, N, of the seats in an inverted position and bolts or slides, s, for securing the backs in their said inverted position, as described.

[The nature of this invention and improvement consists in so constructing the car seats as to enable them to answer all the requirements of the ordinary reversible car seats, and at the same time allow them to be swung round or turned on a pivot at one end, in such a manner as to assume an angle of about 45°, with the passage-way through the car, and almost entirely occupy the space between them, and increase the space or passage-way between their ends to such a degree as to leave room in the passage-way for an elongation of the seats when converted into sleeping-couches or berths, to accommodate the length of the passengers by turning up or inverting the backs and extending the slides from their ends.]

SEEDING MACHINES—John Badger, of Bailyville, Ill.: I do not claim, separately, any of the parts described, for they have all been used under different forms of arrangements and in combination with other parts.

But I claim the circular plates, I, and stirrers, h, attached to the rotating shaft, F', within the seed-box, C', arranged and combined with the slotted bottom, D, and slide, E, substantially as and for the purpose set forth.

[In this invention a series of circular plates and stirrers are employed; they are fitted in a rotating shaft, which is placed in a seed-box provided with a slotted bottom and a slide, the whole being arranged so that seed may he sowed very evenly in a broadcast manner, and the amount of seed to be sowed on a given area of ground graduated as desired.]

PEGGING JACKS—T. D. Bailey, of Lowell, Mass.: I claim, first, The method of jacking the last, by turning the plate to which the last is fastened.

Second, I claim the combination of the lever, H, screw, F, and turn-table, T, for jacking the last, substantially as described.

Third, I claim fastening the screw, F, or its equivalent, stationary, by means of the coupling pin, L', and plate, I, so that when the turn-table, T, is revolved, it shall operate the lever and jack the last, substantially as described.

Fourth, I claim fastening the screw, F, or its equivalent, to turn the plate, T, after the last has been jacked by means of the coupling wheel, L, and pin, R, operated by the thumb latch, O, and spring, P, for the purpose of preventing the screw, F, from turning round and loosing the lever, H, substantially as described.

Fifth, I claim the combination of two hinges, S S', cam levers, U U', hinge seat, B, the link, C, and hand set screw, W, for the purpose and substantially as described.

HARVESTERS—J. A. Barrington, of Fredericktown, O.: I claim the combination of the bell crank, C', and guide piece, G, with the crane, C, rod, r, connecting the crank arm, h, with the rakes and the crank shaft, S, giving motion to the system, the operation being substantially as described.

I also claim connecting the entire raking mechanism with the vibrating frame, F, substantially as and for the purpose set forth.

STOVES—B. W. Belson, of Philadelphia, Pa.: I am aware that an annular chamber with air jets above a fire for consuming gases is an old and well-known device, and I therefore limit my claim to the improvement described, to wit:—

The combination of the air chamber, a, surrounding the base of the fire-pot with the annular chamber, f, at the upper part of the fire-pot, as described.

I also claim the jet-pipe, h, in combination with the annular chamber, a, and escape pipe, i, as described.

I also claim the adjustable heater, r, constructed, arranged and operating over the fire, substantially as described.

COMPOSITION FOR ROOFING—C. A. Bremner, of Goshen, N. Y. : I claim the composition consisting of marl and the other substances specified, combined and compounded in about the proportions and in the manner substantially as set forth.

[This is a compound of coal tar, rosin oil, india rubber, shellac and linseed oil, with alum, litharge, borax, ochre and dry marl, which when mixed in the proportion specified in the patent make an excellent and durable roofing cement.]

PEPPER CRUET—H. T. Clawson, of Newberne, N. C.: I claim placing within the perforated top or cap, B, of a pepper cruet or box, A, a rotating or reciprocating partially rotating brush, C, arranged substantially as and for the purpose set forth.

[A rotating or semi-rotating brush is placed within the top of the pepper cruet to prevent the perforations in the top becoming choked, and a free discharge of pepper always obtained.]

CUT-OFF GEAR FOR STEAM ENGINES—John Broughton, of New York City. I claim, first, The combination of the two rockshafts, H H, their arms, N N, the vibrating links, O O, the rods, L L, and the lifters, M M, the whole applied substantially as described to operate upon a tappet or tappets on the valve stem, E, or its equivalent, for the purpose of lifting the valve, and subsequently tripping it by the continued and inherent motion of the lifters.

Second, In combination with the above specified lifting and tripping mechanism, I claim the combination of the pendulous rods, R R, the toggle links, S S, and the slide, T, or their equivalents, connecting with a governor or other means of adjusting the same to vary the positions of the centers of motion, c c, substantially as described for the purpose of varying the point of cutting off the steam.

[By a certain combination of vibrating arms, vibrating links, rods and lifters, the cut-off valve is opened and subsequently tripped by a continuation of the same inherent movement by which the opening is effected. There are also certain devices operating in combination with the lifting and tripping apparatus, for the purpose of rendering the trip motion variable to cut off the steam at different points within the first half of the stroke of the engine. Patents have been procured in foreign countries for this invention.

HARVESTERS—Chester Bullock, of Jamestown, N. Y.: I claim attaching the vibrating cutter to the vibrating bar and fingers, as described.

PROPELLER FOR LIFE-BOATS—Mortimer M. Camp, of New Haven, Conn. : I am aware that submarine boats and diving bells have been so arranged as to be propelled by a single occupant, and I do not therefore claim my invention for the propulsion of either of those articles, as it is only practically applicable to life-saving boats, as described; nor do I claim its application to the life-boat shown, for my invention is applicable to any description of inclosed life-boat however constructed.

But I claim the method of propelling inclosed life-boats by the application of the power of the occupants of the boat, as set forth.

ELLIPSOGRAPH—E. G. Chormann, of Philadelphia, Pa. ; Having fully described the construction and operation of my improved instrument, and disclaiming the broad feature of changing the relative position of the shoes or pins which run in the slots of the plate, or the changing of the distance of the pencil or graver-carrier from the foci.

I claim, first, Constructing the shoes, I, and i', in two parts swiveled together as specified, in combination with the adjusting screw shaft, d', the whole arranged and operating as described.

Second, In combination with the screw adjustment of the movable sboe, the arrangement of the pencil or dry point carrier, f, on a screw shaft, C, in order that the relative lengths of the axes may be readily varied to the smallest extent or a series of concentric ellipses be drawn varying very slightly in size.

Third, Arranging the drawing apparatus with a vibrating adjustable arm, D, on a vertically adjustable arm, B', as described for the purpose set forth.

BREECH-LOADING REVOLVING FIREARM—E. Claude, of New York City : I do not claim of itself extending the chambers through the cylinder, nor the attachment of the barrel to an exterior pin, A, separately considered.

But I claim making the arm, U, between the barrel and exterior shaft, the bearing for the cylinder by a shaft on the forward end of the cylinder passing through and secured to the arm, substantially as described, when the said parts are combined with breech-piece and stock, so that the cylinder is rotated and stopped and the discharge effected, substantially as set forth.

SHINGLES—H. T. Clay, of Gardiner, Me. : I claim, first, A shingle of uniform thickness at the butt so far as it is to be laid to the weather.

Second, A shingle that commences to taper at the point on the upper side, where the next layer above covers it, and tapers all on that side.

PRESERVE CANS—P. H. Cotton, of Demopolis, Ala. : I claim, in combination with the channel, C, outside of the neck of the can, the employment of a recess, e, in the neck and the extension of the rim of the cap over such recess, substantially as and for the purpose specified.

[This invention relates to that kind of preserve can whose cover consists simply of a cap fitting upon the mouth of the can, and is sealed by wax or composition poured into a channel surrounding the neck of the can and rim of the cover. It consists in the way of confining the cover on the can against the pressure of steam that is generated to expel the air, until condensation takes place, and the sealing composition becomes sufficiently hard to retain the cover in its place. It also consists in forming a recess in the lower part of the can, and making the rim of the cap to extend down some distance over the said recess, for the purpose of preventing the sealing composition becoming detached from the sides of the channel, and the cap being thereby loosened.]

BUCKLES—John Cumberland, of Mobile, Ala., and J. R. McClintock, of New York City: We claim the buckle or clasp composed of the parts, A and B, or their equivalents, substantially as described and for the purposes described.

BAGASSE FURNACES—Felix Daunoy, of Carrollton, La. : I claim the construction of bagasse furnaces, having the exit flue, F, located in the interior of the furnace with the openings, K, to admit the gas from combustion, when in combination with the wood or coal chamber, having a skeleton crown, and the grates, B, on which the bagasse is consumed, when made and arranged substantially as and for the purpose set forth.

SLIDE AND FASTENING FOR SKIRT HOOPS—Alexander Douglas and S. S. Sherwood, of New York City: We are aware that a slide and fastening for skirt hoops has been made of a single piece of metal so as to embrace and fasten to the end of the hoop, while a part of the hoop near the other end was permitted to slide through it, or in other words, through a loop which formed a part of it, the attachment to the hoop being formed of loops folding in one direction from a central piece upon the end of the hoop and the slide or loop for the hoop to slide in being formed of loops folding from said central piece in the opposite direction, as seen in the patent granted to R. J. Mann, June 22, 1858, and not in either case forming a continuous connection and junction of metal around the hoop.

We are also aware that the tapes of skeleton skirts have been attached to the hoops by a clamp made by folding lips over from the ends, and punching up a longitudinal strip of the metal to hold the tapes, as shown in the patent granted to A. Smart, Aug. 31, 1858. We make no claim to either of these devices.

The particular improvement which constitutes our invention, and which we claim, is the combined clamp and slide, made entire of one piece by forming the clamp of the divisions, b and c, and the slide of the lips, d, as described, the divisions, b and c, being entire, and connected at both ends to the plate, as shown, thus forming a continuous connection around the end of the hoop for the purpose stated.

CARPET FASTENER—Richard DeCharms, of Philadelphia, Pa. : I claim the described new article of manufacture, to wit, an eyeletted carpet or floor cover binding, for the purposes set forth.

HYDRANTS—S. P. Francisco, and Wm. P. Dickinson, of Reading, Pa. : We do not claim the application and use of a piston and cylinder in connection with a hydrant or fire plug, nor do we confine ourselves to the precise details set forth, so long as the peculiar character of our invention is retained, as the same may be varied.

What we claim is providing said cylinder and piston with suitable openings for the admission of the air, and for the purposes set forth.

BALANCING MILLSTONES—John Fairclough, of Louisville, Ky. : I am aware that adjustable weights have been previously used on millstones, and I therefore do not claim, broadly, such feature.

But I claim the arrangement of the cylinders, I, within the boxes, H, the former being provided with tubes, e, having screw threads on their outer and inner surfaces, and provided with screws, g, and the cylinders provided with projections, l, which fit in the grooves, m, of the boxes, as and for the purpose set forth.

I also claim the plates, h, and bottoms, j, of the cylinders, I, when screwed on the tubes, e, and used in connection with the nuts, k, substantially as and for the purpose specified.

[This is an improved arrangement of adjustable weights, which are fitted in the upper stone or runner in such a manner that the stone may be perfectly balanced on its spindle, both as regards its gravity or weight and the centrifugal force generated by its rotation.]

EXTENSION FINGER RING—Samuel Friend and George Seilor, of New York City: We claim the combination of the spring ring and folding bars, substantially as and for the purposes specified.

MACHINE FOR SEPARATING GARLIC FROM GRAIN—Philip C. Fritz, of Barrytown, N. Y. : I do not confine myself to the precise arrangement of parts shown and described, for the purpose specified, for they may be modified in various ways.

But I claim separating garlic from grain by passing the same between crushing rollers, in the manner substantially as shown and described, that the garlic seed and kernels of grain will be crushed separately between the rollers, and the crushed grain allowed to descend into a proper receptacle, while the garlic seed, on account of the moisture or juice they contain, adhere to the rollers, and are scraped therefrom.

[The grain from which the garlic is to be separated is passed between rollers in such a manner that the garlic seed will be kept separate from the grain, and both crushed by the rollers when the former are not in contact with each other, the grain as soon as crushed falling immediately down between the rollers, while the garlic seed, owing to the moisture or juice they contain, adhere to the rollers, and are scraped therefrom—the separation being due to the adhesive tendency of the crushed garlic seed.]

HORSE POWER FOR DRIVING RECIPROCATING SAWS—Edward M. Fuller, of Salisbury, N. Y. : The particular improvement which constitutes my invention, and which I claim is, the connection of the saw to the main body of a horse power which is operated by the circular movement of the animal, and extending the reciprocating rod, o, or its equivalent, from the main body of the machine across the track of the horse to the saw, in such a position as to allow the horse to pass over it, the parts being constructed, arranged and operating substantially as and for the purposes set forth.

CUT-OFF GEAR FOR STEAM ENGINES—P. W. Gates, D. R. Fraser, and Thomas Chalmers, of Chicago, Ill. : We claim the two sliding toe pieces, L L', constructed as described, and applied within the rocking frame, J, to operate substantially as described, in combination with the double lifters, G e e, attached to the valve-stem, and with a stud and roller j i, or their equivalent, connected with a governor, or otherwise made movable.

[This invention consists in a novel construction of two sliding toe pieces and mode of applying the same to a rocking frame operated by the steam engine, in combination with a double lifter attached to the stem of the cut-off valve, and with a governor or other regulating apparatus to produce and vary the action of the cut-off, for the purpose of controlling the speed of an engine.]

MEDICATED FABRICS—Henry Glynn, of Baltimore, Md. : I claim as a new article of manufacture, cloth or paper chemically prepared, for sanitary purposes, with a solution of which copper, or copper and calomine, are the bases, such manufactured article being designed for the prevention, or as a protection against, infectious or contagious diseases, and made as stated.

PAPER FILES—Edward R. Godfrey, of New York City: I am aware that the method of locking the points of the receiving and transferring hooks or wires have been used as applied to another purpose, and therefore make no claim to this feature of my improved paper and letter file.

But I claim the method of securing and transferring hooks, c and d, to the back or steadying weight, a, by folding and uniting their ends down the entire length of the channel or groove in the lower surface of the back, so as to prevent them from twisting and dropping the file of papers, as would be the case if the ends of the wires were simply riveted into the back.

SEATS AND SLEEPING COUCHES FOR RAILROAD CARS—Plymon B. Green, of Chicago, Ill. : I claim, first, The arrangement under the seat of a sliding drawer, E, which has one portion of its top cushioned, and the other portion open, in combination with the hinged back or cushion, A, and stationary cushions, D N, substantially as and for the purposes set forth.

Second, In combination with the above arrangement of the upper couches on hinges in the peculiar manner specified, so that they can be adjusted with facility, substantially as described.

HANGING WINDOW SASH—Theodore F. Hall, of Marietta, Ohio: I claim the employment and arrangement of pulleys or friction rollers at the lower corners of the sash, and the balancing of the sash on cords, in combination with pulleys and weights, or a weight, substantially as set forth.

MANUFACTURE OF PORTABLE FANS—John C. Hall, of Fayette, Miss. : I claim the fan as a new article of manufacture, when constructed in the manner described.

[This invention consists in having a series of short bars or rods jointed together, so that they may be folded into a compact cylindrical form, and distended to an annular shape. The bars or jointed rods form the frame of the fan, and a piece of silk or other suitable material can be attached to them to form a cover or body, which, when the frame is distended, is stretched sufficiently tight to form an effiicient fan. The fan, when the frame is closed or folded, occupies very little space.]

RAILROAD RAILS—Augustus Plinta, of Albany, N. Y. : I claim the construction of a railway rail by forming the same hollow of an elliptical or oviform shape in cross section, the lower portion of the arch being extended into a foot or flange, and a segment of the upper arch being extended into a lip or face for the tread of car wheels, slots being made through the bottom and across the lower part of the body of the rail, substantially in manner and form and for the purposes set forth in the specification.

MANUFACTURE OF SCISSORS—Henry Havell, of Newark, N. J. : I do not claim, generally, the soldering of a steel plate on to malleable iron, by means of brass or other metal.

But I claim the forming of the blades of scissors or shears by means of the use of the intermediate plate, b, or by soldering or brazing the malleable cast iron and steel together, substantially in the manner and for the purpose described.

I also claim, in the manufacturing of scissors or shears, the use of the die, as before mentioned, and the striking together and into the required line and shape, the component parts of the blades, substantially in the manner and for the purpose described.

METHOD OF GATHERING GRAIN UPON, AND DISCHARGING IT FROM, THE PLATFORM OF HARVESTERS—Obed Hussey, of Baltimore, Md. ; I claim the method described of gathering grain upon and raking it from the platform of a reaping machine, and depositing it upon the ground by a raker riding on the machine directly behind the horses and the gearing facing obliquely towards the grain which the machine is advancing to cut, and who, at a single operation with his rake, first, presses the grain in front of the machine backward against the cutter and over upon the platform; secondly, by a pivotal motion turns the prostrate grain upon the platform with its stalks parallel to the cutter; thirdly, slides the grain endwise off the platform at the side of the machine; and fourthly, deposits the grain in a gavel on the ground behind his seat and across the track of the driving wheel of the machine as set forth.

HOOP LOCK—Edwin A. Jeffery, of Corning, N. Y. : I claim as an improved article of manufacture, a hoop lock composed of a shell or socket, A, and a taper pin, B, made as shown and described.

[A metal socket or shell is provided with a recess or indentation, and a conical key or pin passes through the socket, so that the ends of a a hoop, by being looped or doubled and fitted in the socket, may be firmly secured or connected together.]

BOTTLE-STOPPERS—Thomas Lewis, of Malden, Mass.: I do not claim a tubular self-closing bottle-stopper having a ball valve.

Nor do I claim the improved stopper as patented by Williams.

But I claim my improved ball valve-stopper, as made with the separate cap, C, provided with a discharging tubular mouth, i, and crossed bars, g h, or equivalents, for detaining the ball, as described, and connected with the main tube or body by a screw, or its equivalent.

FOLDING BENCH—Tristam S. Lewis, of Kendall's Mills, Me. : I claim the arrangement and combination of the hinge blocks, a b, the leg slides, E F, and the confining slide, G, as applied to the parts, A B, and their legs, C D, connected or hinged together so as to fold up in the manner substantially as specified.

MACHINES FOR ELEVATING HAY—James C. McGrew, of Smithfield, Ohio: I claim in the described machine for elevating hay, grain, fodder, &c., the arrangement of the bar, a''', and inclined platform, a' a'', with the sheers and hoisting fork, all substantially as described, for the purposes set forth.

BUOYANT PROPELLER—James Montgomery, of New York City : I claim, first, The described or substantially equivalent means of securing the flotation of a screw propeller by ejecting water therefrom by centrifugal action.

Second, The detachable hollow blades, B, in the described combination with the shaft, A, for the purposes set forth.

Third, The application of the valve, l, arranged as described, in the forward end of the hollow shaft, A, for the purpose explained.

SEEDING MACHINES—Albert W. Morse, of Eaton, N. Y. : I do not claim a clod-crusher, nor roller, nor a seed-sower separately.

I claim the arrangement of the hopper, f, with the rollers, g g, belt or strap, E, rollers, m, and rings, a, as described, for the purposes set forth.

DRAUGHTING SHIRTS—John Peckham, of New Haven, Conn. : I am aware that measures for draughting garments have been made by folding tapes or paper strips in such manner as to form a graduated scale, and I therefore do not claim the measures in themselves considered.

But I claim draughting shirts by means of the neck and breast measures, A B, formed and applied to the cloth, as shown and described, so that the neck circle will be chiefly cut or formed in the back portion of the shirt, and the upper part of the back portion folded over and united to the top of the front portion on a line with the base of the neck, as set forth.

[The object of this invention is to obtain a definite rule or system of measurement for drafting shirts, by which a person's measure may be taken and laid or drawn out upon the muslin or other cloth with perfect accuracy, and in such a manner as not only to insure a perfect fit, but also to leave the parts so disposed as to economize in the bosom material, which is generally linen, and render the shirt more durable, and capable of being properly ironed with greater facility than usual.]

QUOINS FOR GUN CARRIAGES—David D. Porter, of U. S. Navy : I claim the combination and arrangement of the degree rack or racks, the axle thereof, the T-bolt, and its groove, with the bed and wedge, substantially as and for the purpose as described.

I do not claim the mere use of raised projections for indicating numbers by the touch of the figures, as I am aware that such is not new.

But I claim the combination and arrangement of the tangible scale and axle with the degree rack and the wedge, so that by the application of the finger to both scale and axle at one and the same time, and during the night or otherwise, the proper position of the wedge may be determined for any desirable elevation of the gun.

SELF-ADJUSTABLE LEVELING INSTRUMENT—Joseph Redhead, of Woodville, Miss. : I claim combining with the dish or case, A, an inclined rod and ball or weight, n, so that when said case is set upon an inclined staff by its steel point, the ball will swing in the case into a level position, for the purpose of making a leveling instrument for ascertaining the ascent or descent of ground, as set forth.

MACHINE FOR BORING WOOD—George F. Rice, of Worcester, Mass. : I do not claim the joints and semi-circles, as that has been known before.

But I claim the hollow cross bar, together with the double head bolt, which enables the operator to fasten the uprights at any angle by simply turning one nut, the whole being constructed substantially in the manner as described, and for the purposes specified.

GOVERNOR FOR STEAM ENGINES—H. C. Sergeant, of Columbus, Ohio : I claim, first, A steam engine governor composed in part of a steam engine which is subject to a uniform resistance, and which works independently of, and by its own velocity controls the velocity of the engine to be governed, substantially as set forth.

Second, The employment of two disks, I and N, having spiral projections, f f and j j, on their faces, and provided with stop pins, q q, applied substantially as described, to combine an engine which is to be regulated, with an isochronous revolving regulator.

Third, The combination of what is herein termed the "regulator engine," its regulator S T k l m, and regulating valve, U, or their equivalents, and the shafts, H, and M, and their spiral-faced disks, I P, one driven by said engine, and the other by the engine to be govern-

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ed, the whole applied and operating in combination with a regulating valve, B B', or its equivalent, substantially as described.

[A notice of this improvement will be given next week.]

BRUSH—Reuben Shaler, of Madison, Conn. : I am aware that brushes have been made in which the bristles have been attached to a cylinder in tufts spirally arranged in rows around it; I make no claim to such a form of arranging the bristles.

I am also aware that bristles have been secured in position, after they have been attached to the handle, by pouring melted resin upon their ends, or by filling the end of the brush with glue. I do not claim these modes of cementing in the bristles.

I claim as a new article of manufacture, a brush, the bristles of which are secured by winding them into a spiral groove, and fastening them in the manner described or by winding them into cement, as set forth.

BOILER FURNACES—Evan Skelly, of Plaquemine, La. : I am aware that stoves have been made in which the fire chamber is fashioned in the form of a cone, the escape opening being contracted.

I do not claim, broadly, the making of furnaces of conical shape.

I do not claim, broadly, the idea of contracting the escape opening.

I do not claim the arrangement of bridge walls alternately on opposite sides of the main flue.

But I claim the combination and arrangement of the gradually-contracted fire chamber, C, with the bridges, F F G G, as shown and described, for the purposes set forth.

[This invention consists in a novel arrangement of bridges under a double cylinder boiler, to arrest the too rapid escape of the gaseous products of combustion, and keep them in contact with the boiler till they have yielded up as much as possible of their heat to the boiler. It also consists in the gradual lateral contraction of the fire chamber and grate towards the rear, for the purpose of preventing the escape of any air or combustible gases without being consumed.]

HARNESS BUCKLES—Orin B. Smith, of Monticello, N. Y. : I claim the combination of the lever, C, operating as described, with the bow, B', for the purpose of making a harness or other buckle, and to which may be attached straps, A and B, as set forth.

HOMINY MILLS—Ira Speight, of Woodville, Miss. : I claim hanging mill-stones by means of right and left screws, substantially as and for the purposes set forth.

BUCKLES FOR SKIRT HOOPS—John Stevens and Jas. Handley, of New York City : We claim the buckle, when constructed substantially in the manner described, in combination with the slides, having holes to receive the hook of the buckle, for the purpose set forth.

MITER BOX—Asa F. Tait, of Rockport, Mass. : I claim as an improved article of manufacture, a miter box having a sliding frame, F, attached to pivoted standards, g, and otherwise made as shown and described.

[To an ordinary miter box a sliding guide frame is attached, so arranged as to guide the saw perfectly without the aid of the usual kerfs in the box, and thereby obviate the difficulty attending the wearing or cutting away of the kerfs—a contingency which occurs in using the ordinary box, and soon renders them inaccurate.]

CAM PRESS—Enoch Thomas, of Beverly, Va. : I claim the mode of making and arranging the journal boxes so as easily to vary the space under the follower, and retain the uniform position of the pressure, in combination with the cam and windlass, cast solid, when constructed and operated substantially as specified and for the purposes set forth.

DYNAMOMETER—Wm. Tucker, of Blackstone, Mass. : I claim the combination of the grooved slider, D, and its screw connection, G, with the index-pointer, E, or its equivalent, and the spring, C, and pulley, A, or its equivalent, applied to a shaft, B, substantially as described, the slider having a feather connection, a, with the said shaft, as explained.

PLOWS—Reed Vincent, of Rockton, Ill. : I claim the combination of the convex standard, A, the braces, B D, and the mold-board, when arranged in connection with the beam and bent handles, C, as described and represented, and for the purpose set forth.

LABLES FOR TREES, &c.—Francis T. Cordis and William W. Wade, of Long Meadow, Mass. : We claim the combination of a metallic rim or back with paper, or other suitable substance, on which is written or printed the name of a tree, shrub, plant, or seed, and a plate or plates of mica and a metallic ring, in either of the modes in the specification described, as a tag or label for designating and distinguishing the varieties of trees, shrubs, plants and seeds, in orchards, nurseries, and gardens, as described.

APPARATUS FOR PURIFYING GAS—Andrew Walker, of Claremont, N. H. : I do not claim the purification of illuminating gas by means of water, when applied in a shower of drops, or of finely-divided streams.

But I claim the combination and arrangement of separate chambers, opening into each other in such manner that a current of water or fluid may be made to flow through the series in thin falls or sheets, or from one chamber to the next in a thin fall or sheet, substantially as described, and a current of gas be made to pass upward and through the several chambers, and successively through and against the several falls or sheets of fluid, essentially as explained, the chambers being disposed one over the other in column, and the whole being to effect the purification of gas for illumination, as described.

STOVES—David Wells, of Lowell, Mass. : I am aware that various plans have been devised for admitting heated air into stoves and furnaces, so that the products of combustion may be mixed therewith, in order to insure the burning of the same; I therefore do not claim, broadly, such idea.

But I claim the arrangement of the flues D' D', smoke chamber, E, air-heating chamber, G, and fire chamber, B, the latter communicating with the smoke chamber by means of the perforations, b, and the smoke chamber communicating with the air-heating chamber by perforations, a, substantially as and for the purpose set forth.

[This invention consists in a peculiar arrangement of flues, an air-heating chamber, and smoke chamber, whereby the combustible portion of the products of combustion is brought in contact with a suitable portion of heated atmospheric air, and ignited in a chamber separate from the fire chamber, but by the heat or fire therefrom. The object of the invention is to obtain all the advantages derived from the consuming of the combustible portion of the products of combustion without detracting from the efficacy of the fire chamber itself as a source of heat, by admitting directly upon or over the fire, atmospheric air, in order to consume the inflammable portion of the escaping gas.]

MANUFACTURE OF GLASS FURNACES AND POTS—Ezra Wells, of Covington, Pa. : I claim a new article of manufacture, namely, pots and furnaces made of the black American clay, for use in manufacturing glass and glassware, substantially as set forth, for the purposes described.

METHOD OF ATTACHING CUTTING LIPS TO AUGER SHANKS—Norman S. White and Aaron Denio, of Shattsbury, Vt. : We do not claim, broadly, attaching the cutting parts to the screw shaft of augers.

But we claim the specific manner set forth and shown in the specification.

SMUT MACHINES—J. A. Woodward, of Burlington, Iowa : I do not claim the curved blast spout, A.

Nor do I claim, broadly, a scouring device connected therewith, for such may be seen in the patented case of mine formerly alluded to.

But I claim the arrangement of the wire cloth cylinder, G, scourer, E, deflecting or separating bar, I, spout, f', and shoe, J, as and for the purpose set forth.

[The smut mill patented by this inventor October 20th, 1857, in the subject of the present improvements the object of which are to effect a more thorough separation of the dust and other foreign matters from the grain before the latter is brought in contact with the scourers, and also to augment, to a very considerable degree, the efficiency of the scouring device, as well as the part designed for the separation of the light or imperfect grain from the offal or foreign matters.]

INSTRUMENT FOR MEASURING ALTITUDES, &c.—George C. Ayling, (assignor to himself and Henry A. Ayling), of Boston, Mass. : I do not claim the combination of the detector glass with the index and horizon glasses.

But I claim the arrangement of the index glass with respect to the detector glass, so as to enable the latter to be moved either into parallelism with, or at right angles to the former, and combining with the detector glass and the main divided arc and index, a secondary index and divided arc, applied to register the movements of the detector glass, substantially as described.

WATCH FACES—Samuel Baldwin (assignor to Baldwin & Co.), of Newark, N. J. : I claim arranging the figures of the dial without turning the works of the watch in a plane parallel to its face, substantially as described, so that they may be in the proper positions in relation to the pendant, whether the dial faces the open or closed bizzle of the case.

CLOTHES FRAME—William Hathaway (assignor to William G. Maynard), of Worcester, Mass. : I claim arranging the center of motion of the cross bars, substantially as described, so that the center of motion of the outer end of the cross bar, when the frame is closed, will be over or within the center of motion of the inner end of the cross bar, for the purpose set forth.

HEMP BRAKES—Robert Heneage (assignor to himself and Edward O. Ball), of Buffalo, N. Y. : First, I claim the combination of the reversing mechanism with the brake, B B2, beater, C C2, and shell, K, substantially as described, and for the purpose of dressing hemp, as set forth.

Second, I claim the combination and arrangement of the brake, B B2, with the revolving beater, C C', shell, K, and revolving apron, J, for the purpose of dressing flax, substantially as set forth.

Third, I claim the arrangement of the chamber, X, within the machine, for the purpose of affording room for the movements of the hemp while being dressed, substantially as described.

MACHINE FOR TURNING TAPERING TWISTS ON WOOD—Reuben K. Huntoon, (assignor to himself and Jacob B. Rand), of Concord, N. H. : I do not claim the invention of pattern guides, E E, applied to a moving carriage, J, and irrespectively of a rotary twist block, and the mechanism connecting the same with the stock mandrels or arbors.

Nor do I claim stationary rests for the carriage guides, E E, to move on.

But I claim the arrangement of the several separate devices described, when operated as set forth, for turning irregular tapering forms of wood.

MANUFACTURE OF PAPER PULP FROM WOOD—Charles Marzoni, (assignor to J. Gandolfo), of New York City : First, I claim the use and application of the peculiar stone called "adamantine" described, when used as a means of tearing the woody fiber into a state suitable for pulp for paper, as described, by rotation or any other substantially similar manner.

Second, I do not claim steaming the wood, nor the use merely of hot water.

But I claim the combining the use of the hot water at the boiling point, or 210° Fah., with the stone in rotation while acting upon the wood simultaneously and continuously, so as that the hot water and flakes or particles of woody fiber immediately become united into pulp.

Third, I claim the apparatus consisting of the cover or box, E, the boxed openings therein, 1 2 3 4, and arms, rods and weights, 7 8 9, by which the blocks of wood are fed and held to the surface of the stone.

FAUCETS—Martin Robbins and James Powell (assignors to James Powell), of Cincinnati, Ohio : We claim the application to the key stem of the collar, I, cushion, Q, and loose collar, R, or their equivalents, arranged and operating in combination in the manner described, to compensate for the lateral wear or displacement of the stem.

ICE PICK—John L. Rowe (assignor to Frederick Stevens), of New York City : I do not claim the handle rod or point, as these are well known.

But I claim the spiral spring, D, in combination with the handle, A, rod, F, and point, B, as arranged, substantially as and for the purpose specified.

RE-ISSUES.

REAPING MACHINES—C. W. McCormick, of Chicago, Ill. Patented Oct. 23, 1847—Re-issued May 24, 1853 : I claim the combination of the support or stand for the raker, placed behind the axis of the reel, balanced or sustained with the raker thereon by the driving wheel with the reel, and with the short platform.

Also, I claim combining with the side draft reel reaping machine, having a reel for gathering the grain to the platform, a stand or seat for the raker fixed firmly upon the platform of the machine so as to enable the raeer securely to get at the grain as deposited on the platform by the reel and deliver and lay it properly on the ground from a single or short platform out or the return track of the horses in suitable gavels for being bound into sheaves.

Also, I claim the combination of the reel for gathering the grain to the cutting apparatus, and depositing it on the platform, with the stand or support for the raker, or the equivalent thereof, to enable him with ease and celerity regularly to remove the grain from the machine, and lay it on the ground, out of the return track of the horses.

And I also claim the construction of the stand or support for the raker, on the frame or platform of the machine, so that it gives to the raker such lateral and forward support to his body when standing at work that he may have free use of his arms and the upper part of his body to remove the cut grain from the platform, while at the same time he is so held fast that he cannot be thrown upon the reel, nor prevented from performing his functions by the jolting of the machine as it moves over the uneven ground.

ADDITIONAL IMPROVEMENTS.

MACHINERY FOR DRESSING AND SIZING WARPS—Wm. Bradley, of Manchester, Va. Patented May 11, 1858 : I claim the covering of the drying rollers, with some non-conductor of heat, or material having less conductive properties than the material, to prevent the caking, or uneven drying of the size in the warps.

CAR SEATS AND COUCHES—A. M. Holmes, (assignor to himself and A. G. Purdy), of Morrisville, N. Y. Patented Dec. 6, 1858 : I claim the use of the adjustable back-pad or equivalent, and combined therewith the adjustable head rests.

A CARD TO INVENTORS AND PATENTEES.

INVENTORS who have made improvements upon which they desire to procure Letters Patent, will do well to bear in mind that the Proprietors of the SCIENTIFIC AMERICAN have had upwards of thirteen years' experience in the examination of inventions, and during this time have unquestionably had more cases brought under their immediate notice than any other Patent Agency in the United States. It would be absurd to suppose that this extended experience did not afford them unparalleled facilities for the rapid and successful prosecution of this department of professional business. Messrs. Munn & Co. have made *thousands* of personal examinations at the United States Patent Office into novelty of inventions, and are familiar with the law, the rules and the regulations that govern the examination of cases, and are having daily intercourse with the Honorable Commissioner of Patents and the Examiners. Messrs. Munn & Co. have, during the last few years, successfully prosecuted hundreds of rejected cases, not for their own clients merely, but for agents of limited experience, whose offices are remote from that great storehouse of American genius, the United States Patent Office. They venture the assertion that, possessing such advantages and facilities as they do, no other Patent Agency in the United States can offer equal inducements to the worthy inventors of this country. In proof of the unparalleled amount of business transacted through the Scientific American Patent Agency, it is only necessary to refer to the letter of the Hon. Charles Mason, the late respected Commissioner of Patents, published below, and to the still more significant fact that nearly ONE THOUSAND PATENTS were issued, during the past year, to inventors whose cases were prepared and prosecuted through the Scientific American Patent Office.

Notwithstanding the multiplicity of Patent Agents in the United States, the business of Messrs. Munn & Co. is steadily on the increase. At no former period has their professional practice been so extensive as at present, which fact indicates that inventors throughout the country have the most perfect confidence in their integrity and mode of transacting this class of business. Their experience covers the most remarkable years of inventive progress; their knowledge could not be purchased by money, any more than an abstruse science could be acquired without laborious study and many experiments. They have facilities within their power by which the entire business of the United States Patent Office could be successfully carried on through their Agency *alone*. If cases are rejected, they are rigorously investigated. Appeals, interferences, and extensions are also conducted with the greatest care. In fact, every department of the business connected with the Patent Office receives their attention.

If an inventor wishes to procure patents in Great Britain, France, Belgium, Austria, Russia, Prussia, Spain, Holland or any other foreign country where patent laws exist, Messrs. Munn & Co., through their old established agencies in London, Paris and Brussels, can attend to it with great dispatch, and will, upon application, furnish all needful information, either in person at their offices in New York and Washington or by letter. Inventors should remember that Munn & Co.'s office in Washington is not a *mere* "Agency," in which inventions are exposed to the view of *outside* parties, but it is a Branch Establishment, managed by Messrs. Munn & Co., and their confidential clerks.

Messrs. Munn & Co. wish it to be distinctly understood that they *neither buy nor sell* patents. They regard it as inconsistent with a proper management of the interests and claims of inventors, to participate in the least apparent speculation in the rights of patentees. They would also advise patentees to be extremely cautious into whose hands they entrust the power to dispose of their inventions. Nearly fourteen years' observation has convinced M. & Co. that the selling of patents cannot be conducted by the same parties who solicit them for others, without causing distrust.

Inventors who wish to personally consult with Messrs. Munn & Co. can freely do so, and receive promptly all needful advice, free of charge, and their letters will be treated as confidential.

PRINCIPAL OFFICE—128 Fulton street, New York City.

BRANCH OFFICE—Corner of F and Seventh street, Washington, D. C., opposite the United States Patent Office.

FOREIGN OFFICES—London, 66 Chancery Lane.
" " Paris, 29 Boulevard St. Martin.
" " Brussels, 26 Rue des Eperonniers.

The annexed letter from the late Commissioner of Patents we commend to the perusal of all persons interested in obtaining patents :—

MESSRS. MUNN & CO.—I take pleasure in stating that while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE came through your hands. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the Office, a marked degree of promptness, skill, and fidelity to the interests of your employers.

Yours, very truly, CHAS. MASON.

Communications and remittances should be addressed to MUNN & COMPANY,
No. 128 Fulton street, New York.

Testing Vinegar.

MESSRS. EDITORS—Your answer to S. B. L., of N. Y., that the hydrometer is valueless in determining the quality of vinegar, is perfectly correct. But as to other instruments for testing, I wish to call your attention to an acetometer, made after Otto, where the test is chemical, and turns tincture of litmus into a red liquid, and in neutralizing the acid by ammonia, it becomes blue. This acetometer is graduated so, that in filling the first part with tincture of litmus, and the second part with the vinegar to be tested, the mixture turns red; now by adding gradually aqua ammonia of a certain strength, till the mixture commences turning blue, the quantity used indicates the purity of the vinegar. I can furnish tubes and instructions of use.

LOUIS BLACK.

Detroit, Mich., December, 1858.

The Speed of Railway Cars.

Many of the accidents which happen to persons attempting to cross railroads are the results of ignorance of the velocity of the iron horse when fairly under way. A writer in the Hartford *Courant* gives some interesting facts which it may be well to bear in mind :

"It seems almost incredible that, as we glide smoothly along, the elegantly furnished car moves nearly twice its length in a second of time—about 74 feet. At this velocity we find that the locomotive driving wheels, six feet in diameter, make four revolutions per second. It is no idle piston rod that traverses the cylinder thus eight times per second.

"If a man with a horse and carriage upon an unimportant public road in a country town should approach and cross the track at a speed of six miles per hour, which would be crossing rapidly, an express train approaching at the moment would move towards him two hundred and fifty-seven feet while he was in the act of crossing a distance barely sufficient to clear the horse and vehicle. If the horse was moving at a rate no faster than a walk, as the track is usually crossed, the train would move towards him, while in the act of crossing, more than five hundred feet. This fact accounts for the many accidents at such points. The person driving thinks he may cross because the train is a few rods distant.

"How compares the highest speed of the train with the velocity of sound? When the whistle is opened at the eighty rod 'whistle post,' the train will advance nearly one hundred feet before the sound traverses the distance to and is heard at the crossings. The velocity exceeds the flight of birds. The late Dr. J. L. Comstock, the well-known author of several philosophical works, informed the writer that he was recently passing through western New York when the train actually 'ran down' and killed a common hawk. The train was stopped, and the game so rarely captured was secured."

Locomotive Expenses.

The whole number of locomotives on the New York Central Railroad is 212, and the aggregate number of miles performed by them during the three months ending October last, was 1,011,908 miles. The total cost for repairs and running expenses in that period was $190,389 74, averaging 18.80 per mile. The fuel expense alone was 8.50 per mile; wood was used at $3 50 per cord, and no less than 24,587½ cords were consumed in the above mentioned period. The average distance run with one cord was 41.15 miles. The entire length of this railroad, with all its divisions, is 556 miles. Considerable quantities of pork are employed as a lubricating agent, no less than 2,930 pounds being used on this railroad in three months, together with 6,816 gallons of oil.

Heating Schools.

Of all the blessings that can be enjoyed by man, health is the greatest; and as it is the luxury of old age, it should be the birthright of childhood. Yet our present system of heating public schools with immense stoves, the flues of which are often hot enough to scorch the floors on which they stand, is prejudicial in the extreme; and, as every teacher knows, is productive of headaches, bleeding at the nose, and incapacity for study; it also lays the foundation of sickness, and deprives the little ones of the ruddy face, and physical strength to enjoy good out-door romps. Cannot some better system be introduced—hot water or steam? The School Commissioners should look to it if they hope to make men and women worthy the name from the pupils of the schools.

BALLS TO REMOVE GREASE.—Take soft soap and fullers' earth, of each half a pound; beat them well together in a mortar, and form into cakes. The spot on the cloth being first moistened with water, is rubbed with a cake, and allowed to dry, when it is well rubbed with a little warm water, and afterwards rinsed or rubbed off clean.

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New Inventions.

New Portable Forge.

The apparatus shown in our engraving, which we copy from *Le Genie Industriel*, is the invention of M. Hick. It is a portable forge with blast attached, and can carry all the accessories necessary to its use.

Fig. 1 is an elevation, and Fig. 2 is a plan. It is composed of a rectangular box. rounded at its front angles, and open at the top, being supported by two wheels and two feet, and it is provided with handles for its transport from place to place. A back and

Fig. 1

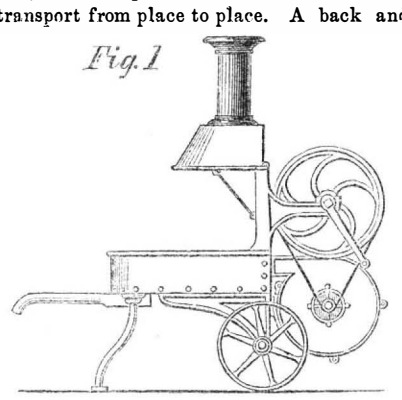
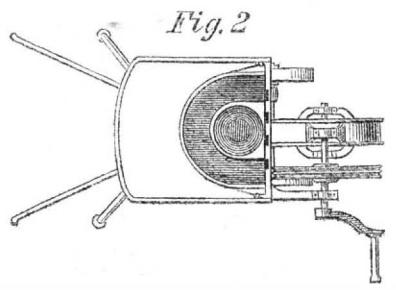


Fig. 2



chimney rise from the fire-box, the lower part of the chimney being developed into a hood. In front of the wheel is the rotary fan or blower rotated by a belt or strap passing around a much larger wheel that is rotated by a crank. The whole can be made of metal, and it is light and convenient, and as the heat of the furnace or fire depends upon the force of the blast; by rotating the crank faster than for common blacksmiths' work, the metals may be fused in crucibles, and many metallurgical operations performed. From its appearance, we should not think that it cost any more to construct than the common portable forge which does not combine with it as this does, a small blast furnace. We should recommend any person wishing to construct one to line the inside of the fire-box with fire clay, and then the whole will last much longer, and bear a considerably greater heat than the bare cast or wrought iron plate.

New Patent Pump.

The importance of the pump as an aid to domestic comfort and the real progress of man, by furnishing us with a plentiful supply of that great blessing, pure water, is acknowledged by all, especially by inventors. This is evidenced by the fact that much of their attention has been given to the improvement of pumps, so as to overcome all the difficulties connected with them, and render them—as the universality of their use demands—perfect in their action.

The subject of our engraving illustrates a valuable improvement in pumps, invented by Henry Zeug, of Elizabethport, N. J., and patented by him July 27th, 1858, the principles and advantages of which will be seen from the following description. Fig. 1 is a view of the pump, with one barrel in perspective and one in section.

The cylinder, B, piston, C, piston rod, D, cylinder bottom, A, and head, G, are all of the usual construction; the pistons are worked by brakers, and in the common way. H is the escape pipe, that passes into the head, G, and so communicates with the cylinder. J is the supply pipe, communicating with the bottom of the cylinder, A. An ordinary ball valve, I, closes the upper end of J in A, and a similar valve in the piston, C, closes the opening in it. The improvement consists in the employment of a loose valve or plate, F, (seen separated in Fig. 2) fitted to and held in place by the piston rod, the two passages, *a a*, allowing the water to pass past it to the escape pipe, H, and these being closed by it when on its seat, prevents the water flowing back through them.

The operation is as follows:—The water that is in the cylinder (or the air, at the first stroke) when the piston is elevated, lifts the valve, F, and forces the water into the chamber in G, and so to H, as in other force pumps, the valve in the piston being closed, the water follows it through the valve, I. When the piston descends, the valve, F, closes and retains the water above it, and I also being closed, the water passes through the piston to its upper part, ready for the next upward stroke. There being two cylinders, the stream from H is always constant and steady.

This is a simple and convenient pump, as any one conversant with these instruments can at once see. Any further information can be had by addressing the inventor as above.

ZEUG'S IMPROVED PUMP.

Fig. 1

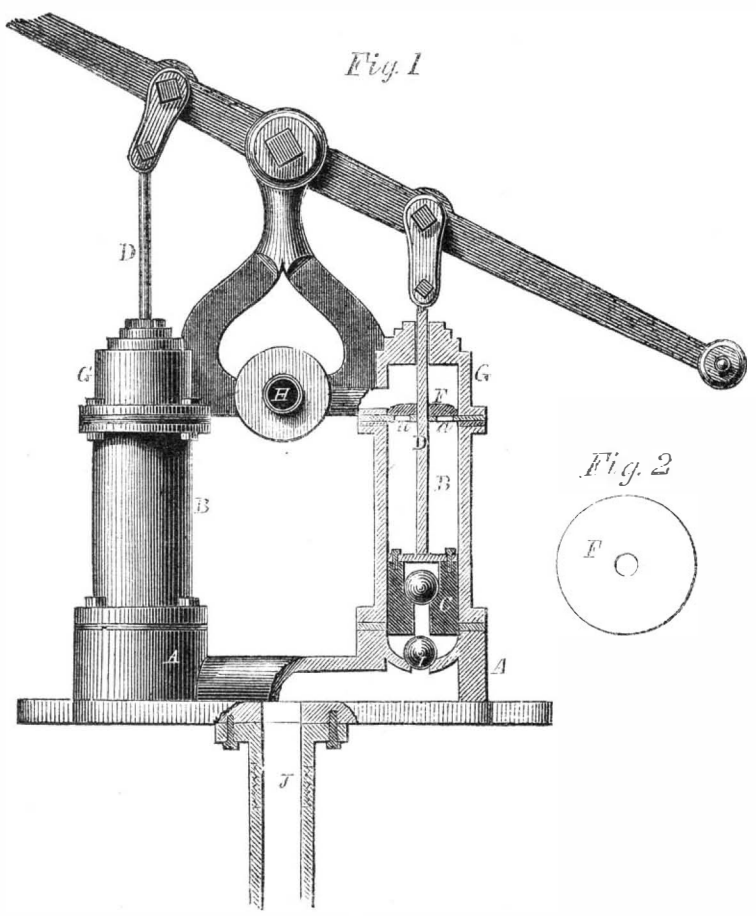
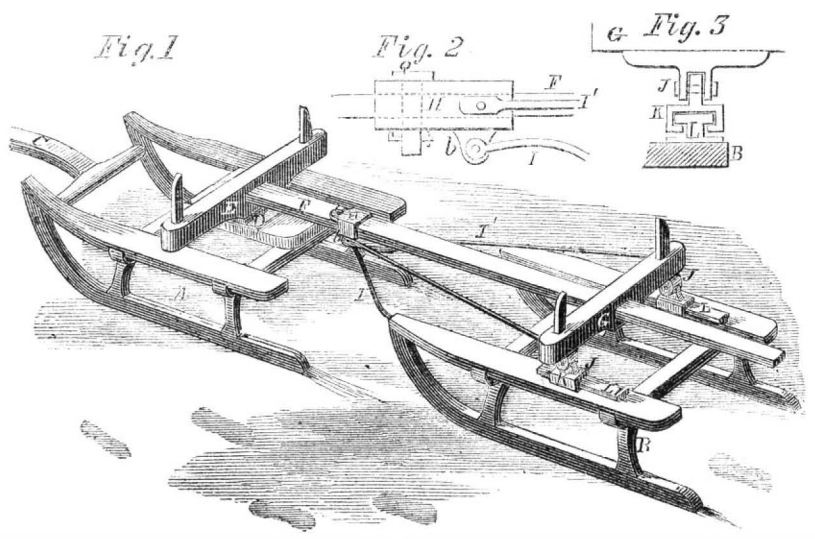


Fig. 2

IMPROVED SLEIGH-RUNNER ATTACHMENT.



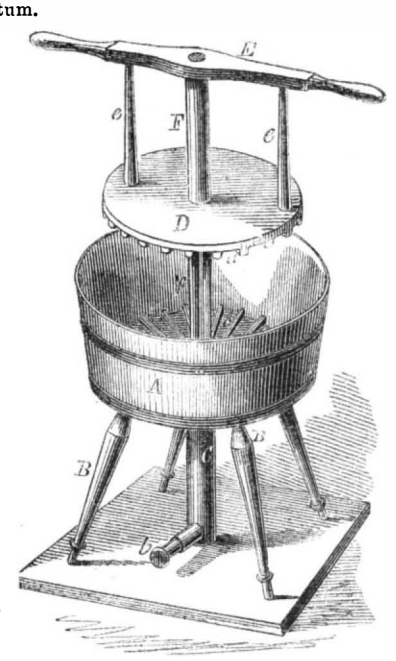
It is, indeed, a great blessing that, while the winter deprives us of so many enjoyments, it brings in its train a corresponding number of compensating pleasures. Chief among these, in our own estimation, is the merry jingle of the sleigh bell, ringing out its jolly music, suggestive of moonlight drives, with bright fires and wholesome suppers at the end of them, taking the place of the dull, heavy sound of the monotonous wheel. "Ah!" says the practical reader, "this is pleasure—what of business?" Well, the subject of our engraving is an improved method of attaching sleigh runners either to the freight wagon laden with merchandize, or to the buffalo-robed seats suitable for transporting the most fairy forms of our imagination.

Fig. 1 is a perspective view of the runners of a sleigh, A being the front one, and B the last one. C is the pole, and D the piece to which the king-bolt of the front cross-tree, E, is attached. To E is secured the perch, F, having secured to it the piece, H, from which rods, I, hinged to it at *b*, pass to the front of runner, B. This perch, F, passes through the cross-tree, G, and the piece, H, is connected with the cross-tree, G, by rods, I′, also hinged at *b*. The piece, H, and its connections are better seen in the outline diagram, Fig. 2. On the last runner, B, are secured T-ways or rails, L, and over these work the suitably grooved pieces or bearings, K, attached by a hinge, J, to a casting secured to G. The section through these parts at Fig. 3 will illustrate this arrangement. By this means the sleigh accommodates itself to any inequalities, and the connection between the runners and the body, has exactly the same action as the springs of an ordinary vehicle.

This, which every one must allow is a great improvement, is the invention of W. W. St. John, of Lima, N.Y., and was patented by him July 13, 1858. He will be happy to furnish any more desired information upon being addressed as above.

Jordan's Washing Machine.

The want of some method of guiding the rubber of tub washing-machines, and controlling in some degree its motion, has long been felt; and the invention which is the subject of our engraving fully supplies this desideratum.



A is a tub, secured to a bench or legs, B. C is a metal tube, the upper end of which is fitted in the bottom of the tub, and opens into it. The tube, C, extends downward nearly to the floor, and is provided with a faucet, *b*, near its lower end. The upper surface of the bottom is provided with radial taper projections, *c*, and the under surface of the disk or rubber, D, is provided with similar projections, *d*. This disk is constructed in the usual way, and has two uprights, *e e*, attached to it near its periphery at opposite sides of its center. The upper ends of the uprights are connected by a cross-piece, E, in the center of which the upper end of a shaft, F, is fitted. This shaft, F, is grooved and slotted at its lower part, *f*, and passes across a wire in the bottom of the hub, and loosely down into the tube, C. This controls the motion, not permitting the rubber to be oscillated beyond an easy distance for the arms of the operator, and also steadies or guides it.

The operation is as follows:—The clothes to be washed are placed within the tub, A, the disk or rubber, D, resting upon them, and the disk is operated by applying the hands to the ends of the cross-piece, E, and giving it the proper motion, so that the clothes receive a perfect rubbing. When the clothes are washed, the rubber is elevated as far as the wire or key across the mouth of C in A will allow it, and the clothes are taken out. The faucet, *b*, being then removed from C, the water is allowed to run away, or fresh clothes placed in the tub in the same water.

The inventor is W. A. Jordan, of Thibodeaux, La., from whom any further particulars can be obtained. It was patented Aug. 24, 1858, and noticed on page 410 of the last volume, Scientific American.

A Lucky Inventor.—It is reported that Mr. Ryerson, the inventor of the recently patented diving bell, which is raised or lowered by means of condensed air, and that is now used in removing Diamond Rock, has sold the right to use his bell in the northern lakes for the sum of $50,000.—*New York Sun*.

The skeletons of leaves may be obtained by soaking them in a weak solution of sulphuric acid, which eats away the body of the leaf, leaving only the fibers, in the form of a delicate network.

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Scientific American.

NEW YORK, JANUARY 1, 1859.

REMOVAL.

On or about the 1st of February next, the Publication Office of the SCIENTIFIC AMERICAN, and the Patent Agency Department connected therewith, will be removed from 128 Fulton street to the spacious offices in the new building, Nos. 37 Park row and 145 Nassau street; the principal entrance being on the eastern side of the City Hall Park. This change we find necessary in order to meet the continual growth of both departments of our business; and we shall expect, at the time above specified, to show our friends, and such of the public as may feel disposed to call upon us, the most complete and thoroughly organized establishment of the kind in the world.

Welcome the New Year!

Eighteen Hundred and Fifty-nine! Why it seems but yesterday that we ushered in, with due rejoicings and social joy, the year that, with his hoary cap upon his head, is, as we write, passing quietly but quickly away. Carelessly looking back it seems a short year, but when we analyze the events and separate the facts which make up the history of 1858, we find that it has been as full of incident and importance as any of its predecessors.

The Atlantic cable has been laid, the Queen of Great Britain and the President of the United States are supposed to have exchanged salutations across Old Ocean's bed. It has ceased working; but it is, we are told shortly to be again in working order. Many may ask, "Is this progress?" We answer decidedly, "Yes!" for from the failure we have learned lessons which only experiment can teach, and our creed is, that a difficulty means something to be overcome.

The Crystal Palate has been destroyed by fire and the products of much genius, time, labor and money have been irrevocably lost. These are lessons to be learned from this calamity, but it would seem invidious in us to teach, therefore let each moralize for himself.

Photographic engraving has received a fresh impetus and the day is quickly coming, we hope, when photography will have an application more extended than e'er was dreamt of in the fondest imaginings of Wedgewood, Daguerre, or Draper.

The British Association have been talking about the strength of boilers and we have learned much of practical value and useful interest from their last meeting.

The civilized world of inventors have been busy on the steam-engine, improving mechanical devices, and saving fuel by every possible means.

The *Adriatic* has been across the waters, and we hear a rumor that we are to see the Hovra-then next spring.

Who shall therefore say that we have not progressed in the last year, or that we are not ever marching onward? Of what *we* have done to help that progress, we cannot without egotism reiterate. Let our own columns speak.

Gradually the spirit of commerce, that twelve months ago was so downcast and dejected, has revived, is recuperated, and soars again in its accustomed sphere, shedding blessings all around like a good genius in some fairy tale. On the past we look with pleasure, to the future we gaze with hope. During the last fifty-two weeks, about nine hundred patents have been secured through the SCIENTIFIC AMERICAN Agency, and the cry is "Still they come!"

Were we willing at this festive season, we could find cause for sorrow; hopes unrealized, labor unappreciated, time wasted, and bright spirits gone, may be sources of grief, but we prefer to think of them as part of the grand purpose of Eternal Good, and let the pleasant smile of resignation chase away the tear of mourning.

We should be thankful for the age we live in, as Bailey has eloquently said:—

We live in deeds, not years; in thoughts, not breaths;
In feelings, not in figures on a dial.
We should count time by heart-throbs. He most lives
Who thinks most, feels the noblest, acts the best.

The spirit of mystic fantasy has passed away, and the age of honest truth, that tries men's lives, is now upon us, and it is productive of the good and progress that we see around; the steam-engine replacing manual labor, the sewing-machine saving the fairy fingers for better and more noble deeds than making vanities and repairing tatters.

This number is dated the first day of the opening year; and wishing to be on friendly terms of pleasant intimacy with all our patrons, recollect, kind reader, if you can, amid your joyous mirth or boisterous fun, that the SCIENTIFIC AMERICAN makes you a New Year's call.

The Cigar-Shaped Steamer.

We have received a number of letters from correspondents on the above subject. They concur generally with the views expressed by us on page 109 of the present volume of the SCIENTIFIC AMERICAN, although on some few minor points there is a difference of opinion. J. W. Norcross, of Cicero, N. Y., who has devoted much attention to the subject, and made a number of experiments on the form of vessels, agrees with us in the prominent objection advanced against the cone shape of the Winans' steamer, as being likely to produce excessive rolling. He says:—"I once built a small steamer 60 feet long, retaining a large portion of the cone-spindle principle in her construction; she equalled my expectations in every respect, with the exception of rolling in heavy waves, at which times she would become unmanageable;" and in reference to this point he considers that our answers fully cover the ground. He disagrees with us, however, in reference to the wave-line form; but we are not dogmatic in our views on this point. He admits, as we have pointed out, that the strains will concentrate at the center, but considers this an advantage, as a knowledge of this fact will enable the constructor to make his calculations accordingly, and increase the thickness of the metal towards the middle of the vessel. This is certainly a rather remarkable view of the question, because the strength of this vessel is inversely as its diameter, therefore it follows that the strains concentrate at its very weakest point—its middle—its greatest diameter.

An able engineer writing to us from Albany N. Y., says of this vessel:—"It may do on rivers, but it will dash into waves on the sea, which will sweep her resistlessly fore and aft. Your suggestion of an addition at midship is what she should have." He also believes that her wheel will carry water round with it, and deluge the upper works.

In none of the letters received is there a single opinion dissenting from those expressed by us in regard to the propeller and its arrangement. In the article referred to, had space permitted, we would have dwelt at some greater length on this point; but we perhaps covered the whole field by stating that its wheel was too large, that it was in the wrong place, and that it would carry dead water and impede the vessel's progress. It is quite incomprehensible to us why the projectors of this vessel adopted such a propeller and arranged it in such a position.

The London *Mechanics' Magazine*, in commenting upon the propeller of the cigar-ship, asserts that it will propel the vessel sideways as well as ahead, and give her an oblique motion. The way proposed by our cotemporary to propel this vessel will amuse our readers. He says:—"The only efficacious method of propelling this vessel forward, and forward only, by such means meaning a half-submerged propeller, is that of employing *three* wheels, the middle wheel having a propelling surface equal to the other two and turning in a direction opposite to them. The transverse forces of the three wheels thus arranged would neutralize each other, and the vessel would be propelled ahead as the designers vainly expect her to be with one wheel."

Such a scientific arrangement of propellers, and such a neutralization of forces as that above suggested, would undoubtedly propel the vessel ahead upon the same mechanical principles as that of securing a pair of oxen by their caudal extremities, and starting them off in opposite directions. Our cotemporary—as a reason for his views—asserts that a half-submerged propeller exerts a transverse action opposed to its forward motion. There are quite a number of such propellers running in the United States, and no such action is experienced in them. On our Upper Lakes, also, there are a few steamers which have two semi-submerged propellers, and these are held to be as efficient vessels as any others that navigate those waters.

American Smartness—By an Assumed Englishman.

In the last number of the London *Engineer*, in an article on "American Originality," a most puerile attempt is made to disparage the character of our people, by throwing ridicule upon certain men of genius who have figured somewhat in the columns of the press. Not only this, but the famous yacht *America*, which won such laurels under the management of a "self-taught Yankee engineer" who pouched the Britisher's guineas, is styled as "a contrivance of a flat board for a deck, and an edge board for a keel, with new sails stretched taut and stiff like the mat sails of a Chinaman's junk, not fit for an English gentleman to eat and drink and sleep and purify himself thereon." The writer of the above thus admits that Englishmen do need purifying. Then come our countrymen, William Norris the engineer, of Philadelphia, and Ross Winans, who is set down as "the smartest of the smart men, rich with roubles of Russia and dollars of Baltimore, and who has built a huge building which looks more like a hotel than a house—a hotel for every kind of boarder from Maine to Orleans, with railroad directors standing before him as sheep before the shearers are dumb, and who is now about to astonish the world once again." A passing squib is fired at Capt. Ericsson; and Brown & Lovell, of Boston, are accused of appropriating a leaf of "our own Lipscomb with a variation," in the construction of their new-fangled boat. It is also satirically mentioned that after the Britishers had whipped out China, our fellow-citizen, Townsend Harris, cleared out for Japan, frightened the Emperor, and procured a treaty from his majesty. "A very smart man is Townsend Harris." In like manner, the SCIENTIFIC AMERICAN is accused of "getting hold of a stray copy of a work on reapers (we suppose he means that we *hooked* it), and presenting chapter after chapter without any hint as to its source." All of this statement is false, as our readers of Vol. X well know; but we can not follow the writer in the *Engineer* through the whole of his four-columned essay on American smartness; enough is presented to show the unhappiness of its author's situation.

We are glad to be able to acknowledge that the American people *are* a very smart race; they have more than once stirred John Bull into a rage. On the other hand, however, we are also very glad to be able to acknowledge the solid beef-and-ale-fed qualities of our British friends. They possess one quality which we always did admire—a regard for national honor; for wherever you find an Englishman, he is sure to represent in some way the character of his country, and he will stand up for Britannia everywhere and always; and, in our opinion, this very characteristic should have shamed the above writer out of his labored attempt to vilify those who, if we mistake not, are his own countrymen. Let us be understood: there are certain elongated ear-marks about the above article on American smartness which bear unmistakable evidence of American authorship. A broken-down editor, failing to get pay and appreciation for his peculiar style of smartness in this city, took it into his head to emigrate to England; and we think we do not err in recognizing him as the writer of the above article in the *Engineer*, who thus unblushingly stands forth before the world as the traducer of his own countrymen.

American Union of Inventors.

On the 21st ult., the spacious premises of this new association were thrown open for public admission, and although the day was very rainy, the attendance was good. The steam-engine was not at work, but shortly will be, as we are informed by the manager; and considering the short time which these inventors have had to prepare and collect articles for exhibition, they have succeeded admirably. We did not notice anything particularly new, but at some future and more careful survey, we may be able to find many inventions there worthy of notice. There is still, however, plenty of room, and inventors should contribute their models or machines as quickly as possible, as it is intended, if success attends the enterprise, and we hope it may, to make it a permanent fair for the exhibition of the inventions and industry of our country.

In the evening, an introductory address on "Inventive Genius" was delivered by P. Boileau Jones, Ph. D., who is connected with this journal, and a poem on "Labor" was read by Mr. S. A. Eaton, of Boston. The director, Mr. J. L. Riker made some practical observations on the design of the Union, and asked for that share of patronage and favor which we hope it will receive.

Energy of Heat.

The unit of heat commonly used in scientific treatises is the amount which one pound of water requires in order to raise its temperature one degree. It is suggested by R. Stephenson, C. E., that the unit be expressed in such terms as practical engineers have occasion to use, such as the amount of heat which one pound of water at 212° Fah. requires to convert it into steam of the same temperature, or what is commonly called "the latent heat of steam at 212°." This is the unit of heat now employed in comparing the effects of different kinds of fuel, and forms of furnaces and boilers.

The following are different units of heat reduced to equivalents in mechanical energy: One degree in a pound of water is equivalent in energy to 772 pounds lifted one foot; the latent heat of one pound of atmospheric steam is equivalent to 745,750 pounds lifted one foot. The prevalent idea regarding the action of heat is now recognized by scientific men to be not a substance, but an *energy*.

Extraordinary Boiler Explosion.

A most appalling catastrophe occured at St. Louis on the 19th ult., caused by the bursting of a steam boiler at the large sugar refinery of Messrs. Belcher, by which six persons were killed and several others severely wounded. The evidence taken before the Coroner's jury resulted in a verdict that the explosion was the result of some unknown cause. We would have come to a very different conclusion from the testimony taken, but we have not space in this number to comment either upon the evidence or the verdict. In our next, however, we shall do this, as it appears to us there is too much ignorance still prevailing regarding the cause of steam boiler explosions.

TO CLEAN MARBLE.—Take two ounces of common soda, one of pumice stone, and one of finely powdered chalk; sift them through a fine seive and mix them with water; then rub the mixture well all over the marble and the stains will be removed, now wash the marble over with soap and water, and it will be as clean as it was previous to its being stained. Sometimes the marble is stained yellow with iron-rust; this can be removed with lemon juice.

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Soluble Glass.

MESSRS. EDITORS—My attention was drawn to the communication in No. 14, present volume, of your valuable journal, signed E. W. D., in which your correspondent declares that soluble glass did not answer the purposes described in my letter of November 6th. Having some reputation at stake, and feeling a pride in having (more than twenty-five years ago) introduced this article into the United States, I consider myself bound to reply and refute the objections of your correspondent. I would give him the classical advice, "*experientia docet*," and advise him to continue his experiments a little longer, for the world was not made in a day, and E. W. D. must not hope to realize all his expectations at once, or make his fortune by the outlay of $1 50. The first gallon, it would seem, has failed with him, as might any protective varnish or cement, when used merely as an experiment. He should give it a fair trial before he pronounces such a total condemnation. In support of my position, let me refer him to pages 245 and 246, Vol. 4, of Dr. Muspratt's Applied Chemistry, and for his information I will quote a few passages. After remarking that soluble glass has been applied to several important purposes, among which he enumerates the protecting of building stones from decay, and the hardening of cements and mortars to render them impermeable to water, he says:—

"The stone surfaces of buildings, by being exposed to the action of the atmosphere, become liable to disintegration from various causes. Moisture is absorbed into their pores. The tendency of their particles to separate in consequence of expansion and contraction, produced by alternation of temperature, is thus increased. Sulphurous acid is always present in the atmosphere of coal-burning cities, and cannot but corrode the calcareous and magnesian ingredients of oolites and dolomites. As a preventive of destruction, whether arising from physical or chemical causes, it has been proposed to saturate the surface of the stones with a solution of water glass.

It is well known that the affinity of silica for alkali is so feeble, that it may be so separated from this base by the weakest acids, even by carbonic acid. According to the expectation of those who recommend the silification of stone, the carbonic acid of the atmosphere will set the silica inse from the water glass, and the silica thus separated will be deposited within the pores and around the particles of the stone. The points of contact of these particles will thus be enlarged, and a sort of glazing of insoluble silica will be formed sufficient to protect the stone from the effects of moisture, *et cetera*. This cause of protection applies chiefly to sandstones; but wherever carbonate of lime or carbonate of magnesia enters notably into the composition of the building stone, then an additional chemical action, also sheltering the stone, is expected to take place between these carbonates and the water glass. An insoluble salt of lime may be looked for whenever a solution of water glass is made to act on the carbonates of lime or magnesia existing in oolitic or dolomitic building stones."

He further states that M. Anthon, of Prague, proposed to render mortars waterproof, and to supply soluble glass as a substitute for size in whitewashing and staining walls:—

"It was demonstrated by several experiments, that carbonate of lime, mixed up with a weak solution of water glass, and applied as a whitewash to surfaces, was not washed off by sponging with water; and that common whitewash, laid on in the usual manner with size, was rendered equally adhesive when washed over with water glass."

A patent was granted in England not long ago, for the preservation of stone by means of soluble glass, which consists in the application of chloride of calcium on the stone, and subsequently the soluble glass; this will bear out the editorial remarks affixed to the communication of E. W. D. I will tell him that wood can be made to such an extent proof against fires; that timber, shingles, cars, machine shops, or any other structure exposed to sparks, when coated with a paint composed of plaster of Paris, whiting, oxyd of manganese or soapstone, in combination with the soluble glass, will not take fire. A cement for covering wooden or tin roofs, which becomes as hard as iron, may be made from a composition of ground fluorspar, plaster of Paris, clay, and sand, formed into a plastic mass with soluble glass. The soluble glass forms a most valuable admixture to manure the grape vine, and it is most extensively used for that purpose in France. The soluble glass is a most powerful detergent, and if used in place of soap, has a wonderful effect upon clothes, and saves the washboard to a great extent; and when in combination with chlorine, produces the best bleaching and disinfecting, as well as cleansing substance.

If your correspondent wishes to be better informed on the multifarious useful applications of soluble glass, I will cheerfully communicate with him. F.

Wood Bearings for Shafts—Lubrication.

We have on a former occasion—on page 330, Volume XI., SCIENTIFIC AMERICAN—directed attention to this subject, but we find something new and useful relating to it, and well worthy of notice, in the last number of *Newton's London Journal*. The article is a report of a paper read by John Penn, Esq., before the Institution of Mechanical Engineers in London, of which he is president. At the meeting he exhibited specimens of *lignum vitæ* bearings, which had been used for the propeller shaft of the *Malacca*, a steam sloop-of-war, and although they had been in use three and a half years, and had run 75,000 miles, yet they exhibited scarcely any signs of wear. Brass bearings frequently required repair after a run of 2,000 miles. The weight on these bearings had been about 70 pounds on the square inch, but they could stand a pressure of 700 pounds. In wooden ships, like those of war vessels, iron shafting with brass bearings soon became rough, which effect is attributed to a galvanic action through the copper sheathing, but whether this is the cause or not, wooden bearings were free from such action, and they were found to be the most durable for the propeller shafts of both timber and iron vessels,

Experiments had been made to test the effects of oil and water as lubricating agents with brass and wooden bearings. With brass, and oil as a lubricator, and a pressure per square inch of 448 pounds, the engine had to be stopped in three and a half hours running, with its shaft nearly red hot; under the same pressure with water as a lubricator, the engine run five hours, but the bearings were considerably cut. With *lignum vitæ* wood bearings, and oil as a lubricator, under similar pressure, the wood was charred and crushed in ten minutes. With water as a lubricator, the pressure was raised to 2,688 pounds on the square inch, and the vessel ran nearly five hours without any perceptible wear of the wood, thus proving the superiority of water as a lubricator with wooden bearings. Such bearings for shafting are older than those of metal, but they had entirely gone out of use in steam machinery, and never had been applied in steamships. We now witness a revival of their application with very economical results, every screw propeller in the British navy having been fitted with them during the past three years, and they have been found ten times better than metal bearings. The wood is placed in strips, in slots made in brass boxes, so as to sustain and bear the rubbing of the shaft, in the same manner that soft metal composition bearings in iron boxes were first used in our country, by Mr. Ayres, engineer, of this city.

The Weighing of Coal.

The *Philadelphia Ledger* of the 16th inst., as usual, contains some very judicious remarks on this subject. It advocates the justice of demanding dealers to weigh their coal at the doors of their customers. It states that the coal dealers of that city are opposed—not much to their credit—to the use of self-weighing carts.

The New American Cyclopædia.

This valuable work has reached its fourth volume; and the publishers, Messrs. D. Appleton & Co., may congratulate themselves upon having secured the services of such eminent writers as contribute to its pages. To give our readers a better idea of the work than any criticism or notice could, we have selected a few articles full of information from the published volumes, and from them an idea can be obtained of the character of the work:—

WILLIAM BEAUMONT—A surgeon in the U. S. Army, born in 1796, and died at St. Louis, April 25, 1853. He is principally noted for his discoveries regarding the laws of digestion, and for his experiments upon the body of Alexis St. Martin. In 1822, beaumont was stationed at Michilimackinac, Mich. On June 6th, St. murtin, a young man eighteen years of age, in the service of the American Fur Company, was accidentally shot, receiving the whole charge of a musket in his left side, from a distance of about one yard, carrying with it portions of his clothing, and fracturing two ribs, lacerating the lungs, and entering the stomach. Notwithstanding the severity of the wound, Dr. Beaumont undertook his cure, and by careful and constant treatment and attention, the following year found him enjoying good health, with his former strength and spirits. In 1825, Dr. Beaumont commenced a series of experiments upon the stomach of St. Martin, showing its operations, secretions, the action of the gastric juices, &c.: these experiments he was obliged to discontinue after a few months, but renewed them at various intervals until his death; his patient during so many years presenting the remarkable spectacle of a man enjoying good health, appetite, and spirits, with an aperture opening into his stomach two and one-half inches in circumference, through which the whole action of the stomach might be observed. The result of his experiments was published by Dr. Beaumont in 1833, and has been recognized throughout the medical world as a valuable addition to science. St. Martin is still living, having visited Europe in 1857.

AROMA—The principle in plants or other substances which constitutes their fragrance. In some plants this resides in a volatile oil, but in others the portion containing this principle cannot be detected. It is of an extremely subtle nature, filling the air of rooms, or even the whole atmosphere around gardens; and though constantly imparted, as it may be, for instance, in the case of musk, for years, so as constantly to fill the air of a well-ventilated room, yet never causing to the substance from which it comes any diminution of weight. The aroma of plants is imparted to oils by maceration, but not to water.

ACTINISM—The peculiar property or force of that portion of the sun's rays which produce the chemical effects shown in photography, and also the effect of causing the seeds of plants to germinate. That the actinic rays are different from those which produce heat and light, was shown as far back as 1842 by Professor J. W. Draper, of New York, who recognized in them a new principle or force, for which he proposed the name of *tithonicity*, and for the rays that of *tithonic*. The name now adopted was given by Mr. R. Hunt, of England. It is found that actinism does not exist in the most luminous rays of light, and that these rays actually tend to prevent the peculiar effects of this force upon inorgnnic matter. The quantity of actinism in the sun's rays varies with the time of the day, and with the seasons. Its deficiency in the tropics renders it difficult to obtain good pictures there. Its greater abundance in the spring of the year causes this to be the best period for taking pictures, as it is the season for the germination of seeds and the opening buds. This principle is obstructed by the passage of rays of light through yellow glass. Hence the unsuitableness of this glass for greenhouses.

ABERRATION OF LIGHT—The alteration of apparent position in a heavenly body, due to the fact that the observer on the earth is in motion. When a train of cars is running east during a northerly wind, the wind appears to come from the east of north, and more easterly in proportion to the speed of the train. In like manner, the light from a star appears to come from a point slightly nearer the point towards which the earth chances to be moving, and we see no star in its true place, unless we are moving directly towards or from the star. This causes the star to have a slight annual motion, describing usually a minute eclipse in the sky. The aberration of light, discovered by Bradley, is a beautiful proof of the motion of light, and of the earth's motion. The longest diameter of the minute ellipses of aberration is about one-fortieth the diameter of the moon.

ANILINE—One of the numerous products of the distillation of coal-tar, obtained in the form of a clear oily fluid from the oil of the tar by adding chlorohydric acid, heating and distilling, lime or an alkali being added to retain the acid. The product is redistilled and purified by repeating the process until an oil is obtained, the boiling point of which is 360° Fah., and this is then further purified by heating with oxalic acid and adding potash to form the oxalate of potash. It is also obtained by distilling nitro-benzole and other analogous compounds of carbon, hydrogen, and nitrogen; and lastly, by heating isatine with potash. Isatine is a product of the action of nitric acid upon indigo, whence the name, aniline, was given by Dr. Hoffman, of London, who discovered this substance, from the Spanish *anil*, indigo. The composition of aniline is thus represented: C_{12} H^7 N. Its specific gravity is 1·02; its boiling point 320°, and it does not freeze at —4°. It possesses an aromatic taste and a vinous odor, is very volatile, its vapor being of a brown color. Sulphur, camphor, resin, &c., are dissolved by it; with acids it forms crystalline salts. Its presence is detected by the fine violet blue color produced in a solution of chloride of lime, by adding minute quantities of it. This beautiful blue color is produced also by other similar products of coal-tar, as well as by those of indigo; and the principle which causes it is, probably, the same in both. It is, therefore, not unlikely that coal-tar may be hereafter relied upon to furnish the materials for this color, as also the beautiful red and yellow now produced by madder.

BLACK COPPER—The crude metal produced by the first smelting of copper ores, and which requires subsequent melting and refining to convert it into merchantable copper. It is sometimes conveniently and rudely prepared in cheap furnaces near the copper mines, as the easiest method of concentrating the metallic portions of the ore, and reducing the cost of transportation to distant markets. It generally contains from 70 to 95 per cent of copper, mechanically mixed with metallic iron and a small proportion of other foreign matters.

ÆTHER—A subtile medium much rarer and finer than air, which the ancients believed to pervade space above and beyond the region of the heavy earthy air. The gods above breathed the æther as they lived on ambrosia and nectar, things purer and sweeter than ordinary terrestrial food. It was sometimes personified. Descartes and Sir Isaac Newton both believed in the existence of such spiritual media pervading space.

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Notes and Queries

*** PERSONS who write to us, expecting replies through this column, and those who may desire to make contributions to it of brief interesting facts, must always observe the strict rule, viz., to furnish their names, otherwise we cannot place confidence in their communications.

C. R. I., of N. Y.—Adipocere is human fat combined with ammonia, lime and magnesia. Human bodies turned into stone are called petrifactions, and are totally different from adipocere formations.

J. R., of Ohio.—No re-active force can be obtained from a water wheel without pressure from the escaping water. The work to which you refer on "Millwrighting" is a crude jumble of sense and nonsense. No less than 88 per cent. of the water power is claimed to be obtained in the Lowell turbines.

O. E., of Mich.—There are several excellent German works of a scientific character which would pay well, we think, if translated into the English language. We are well acquainted with the chemical test for vinegar, but that is not what our correspondent inquired about; it was an instrument.

R. H. C., of Va.—If you melt tallow and pour it in among cold water, it will spread out into an extended surface, and become white by exposure to the air. Tallow is submitted to pressure in bags to extract the oil before it is made into candles by experienced chandlers. By exposing candles after they are molded to the air, they become much whiter in the color.

O. J., of Wis.—We have given you all the information we possess regarding the machinery for operating the drills in the sub-Alpine tunnel. A coiled spring of good iron is as good as one of india rubber or steel, and we would prefer it in a rock drill. The whole philosophy of springs may be embraced in the following sentence. "The power which the material possesses in returning to its original condition in the shortest space of time." We do not know whether the other machine to which you refer is in operation or not.

N. Y., of N. Y.—About forty gallons of oil and some paraffine are obtained from a tun of the best cannel coal. No other useful products, we understand, are secured in making kerosene. We are not acquainted with the Fitzmaurice light to which you refer, as described in the London papers. Its merits, we believe, are exaggerated.

C. S., of O.—We do not think that common salt employed in an iron smelting furnace increases its temperature, but it improves the quality of the metal by acting as a flux to remove the impurities.

S. S., of R. I.—We are not aware that sun glasses have been made above a few inches in diameter. The rays of heat may be concentrated at any distance you please behind a glass by the use of several mirrors. Objects have been set on fire at several yards distance by such glasses.

J. B. C., of Tenn.—The wedge-formed boat tapering from bow to stern, and having an inclined floor, is a very good model for sailing in smooth water but it would not answer so well for sea-going vessels, nor for steam propellers.

J. S., of Ohio—The process of rotting flax in water is simply to steep it for about nine days in a stagnant pool in summer, or in a vat with water at a temperature of about 64° Fah.

J. A., of N. S.—Among the earliest telegraphs brought before the public was one for operating, with 26 wires, the several letters of the common alphabet. Electricity could not be employed advantageously in spinning flax to render the fibers adhesive, as it rather tends to impart repulsive qualities to them.

L. P. S., of Conn.—The word "patent" could not be legally stamped on a machine made after the patent has expired.

A. W. Henning—Please inform us in what town and State you reside, and you will hear from us about your invention.

J. G., of Ind.—We thank you for the club of subscribers you sent us. We have been amused with your criticism of the "Miller." It is probably not far out of the way.

W. C. G., of Tenn.—Paddles for wheels, so arranged as to be kept in a vertical position to obviate "back lift," is an old and well-known arrangement.

Money received at the Scientific American Office on account of Patent Office business, for the week ending Friday, December 24, 1858:—

J. R. P., of N. Y., $30; D. D., of N. Y., $30; B. B., of Maine, $30; J. S. McC., of Ala., $35; J. W. P., of N. Y., $60; F. M. D., of Wis., $25; J. W. B., of N. Y., $30; P. A. P., of N. Y., $55; W. H. G., of Del., $30; E. D. L., of N. Y., $25; T. F., of Pa., $30; W. W. H., of L. I., $25; C. E. G., of Ala., $30; E. V. L., of Tex., $25; J. J., of Ohio, $25; E. A. G., of Pa., $25; M. & C., of N. Y., $30; W. T. F., of Tenn., $41; G. O. B., of N. Y., $30; J. T., of Mass., $150; D. P. K., of N. J., $25; I. P. H., of Ill., $30; M. B., of N. Y., $30; S. M. H., of Md., $30; J. R. C., of N. J., $90; L. H., of N. J., $32; F. G., of N. Y., $30; S. O. V., of Ill., $20; J. A. H., of Pa., $30; C. H. D., of Ill., $30; A. O., of N. Y., $30; M. E. & M., of Ill., $60; E. K., of R. I., $25; C. M., of Wis., $36; A. M., of Ohio, $60.

Specifications and drawings belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Friday, Dec. 24, 1858:—

S. T. S., of N. Y.; H. F., of La.; J. A. H., of R. I.; F. M. D., of Wis.; D. P. K., of N. J.; F. J. G., of N. C.; G. G., of Ill.; W. A. H., of N. Y.; E. A. G., of Pa.; W. W. H., of L. I.; H. M., of Ky.; L. W. L., of N. Y.; E. V. L., of Texas; S. O. V., of Ill.; W. T. F., of Tenn.; I. P. T., of Md., (two cases); E. D. L., of N. Y.

PRIMM, WOLFENDEN & CO., MURFREESboro, Tenn., Machinists and Iron Founders. We are prepared to repair all kinds of machinery. We will also sell on commission all kinds of machinery suitable to this location. Manufacturers would do well to consult us, as we are all practical machinists. 17 3*

A CARD—THIS IS TO NOTIFY THE PUBLIC that Lieut. Symmes having found it impossible to get one contestant (Mr. G. Smith) up to the scratch in a breech-loading shooting match of "300 shots a side without cleaning"—which are Mr. Smith's own terms—and having beaten another contestant (Mr. Gibbs) in 100 shots at 600 yards 61 feet in the string, bows all round, and begs to clap his wings and crow, that his breech-loading gun is the champion of the United States; and he will soon show off Europe also, unless some aspiring breech-loader shall take him down in the meantime (for his challenge is always open); and he begs to say that his gun, having made its reputation, will soon make its appearance for general sale, as the best breech-loader. JOHN C. SYMMES,
1st Lieut. U. S. Ordnance.
Watertown Arsenal, Mass., Dec. 25, 1858. 1*

WATER POWER AND MILL SITE FOR SALE—The Society for Establishing Useful Manufactures at Paterson, N. J., propose to lease for 21 years, renewable for ever, a mill lot with six feet of water, to be taken from the first or upper canal, and discharged into the second or middle canal. The head and fall is about 24 feet. The mill lot is well adapted for any manufacturing business. This property is ready to enter on—is at Paterson, and convenient to the city of New York, with railroad and canal conveyance, in the heart of a large manufacturing population, and all the advantages incident to such a locality. For particulars apply at the office of the Society, Paterson, N. J. 17 6*

STEAM ENGINES, STEAM PUMPS AND BOILERS—New and second-hand, now for sale cheap. 20 different sizes of engines, ranging from 2 to 80-horse power; also two large cylinder boilers or heaters, 6 feet diameter, 26 feet long; also a new water wheel, 20 feet diameter, 12 feet wide, ready to put up; also, French burr stone and iron grist mills of the latest and most improved plans, warranted to grind double the quantity that can be ground with the same expense in any mill in use. For further information, call on or address JOHN A. REED,
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WILEY & HALSTED, IMPORTERS AND Publishers, 351 Broadway, New York, have just received a full supply of Weales' Valuable Rudimentary Series, prepared by eminent men in the various departments of science, consisting of treatises on Machinery, Engineering, Architecture, Ship-building, Blasting, Canal Navigation, Steam Engines, Limes and Cements, Navigation, Water Power, Coal Gas, Perspective, Railway Details, Combustion of Coal, Geology, Photography, Chemistry, Agriculture, &c., Masonry, &c., all more or less illustrated. W. & H. are agents for the sale of Colburn & Holly's Permanent Way and Coal-Burning Locomotive Boilers of European Railways, &c., 1 Vol. folio; plates, $10. Liberal discount to the trade. W. & H. have now ready a new Scientific Catalogue, which will be mailed gratis to any address. 1

WEISSENBORN'S PATENT INCRUSTATION PREVENTER for Steam Boilers obviates the formation of scale on the plates by separating the incrusting matter from the water before it enters the boiler, condenses a large portion of the steam, and supplies the purified water to the boiler at boiling heat. The apparatus is compact in size, simple in construction and management, and applicable to all kinds of engines. The subscriber can furnish ample proof of its successful operation in preventing scale, and also as a heater and condenser. Recent modifications in its form and method of working render it still more efficient than heretofore. Probably no modern improvement connected with steam power combines so many advantages as this. The economy of fuel alone from its use soon repays the cost of the apparatus. Prices much reduced, and terms easy.
STEWART KERR (Engineer), Agent,
1* No. 17 Broadway, New York.

GREAT FAIR AND EXHIBITION OF the AMERICAN UNION for Inventors, Manufacturers, Mechanics, &c., at No. 620 Broadway, New York. This Fair is now open to the public; but inventors and others are allowed to send in articles for competition at any time previous to the 20th of January next. Diplomas, &c., will be awarded during the month of March, but the Exhibition will be continued during the year 1859, at No. 620 Broadway. Address communications to J. L. RIKER, Director, American Union, New York. 17 tf

THE WATER-CURE JOURNAL FOR 1859—Devoted to Physiology, Hydropathy, and the Laws of Life and Health, with engravings illustrating the Human System—a guide to health and longevity. Published monthly, at One Dollar a year, by FOWLER & WELLS, No. 308 Broadway, New York.
Good health is our great want. We can obtain it only by a knowledge of the laws of life and the causes of disease, which are clearly presented in the Water-Cure Journal. Particular directions are given for the treatment of ordinary cases at home, so that all may apply it. Believing health to be the basis of all happiness, we rely on the friends of good health to place a copy of the Water-Cure Journal in every family. Now is the time to subscribe. 16 2

FOR SALE—STATE AND COUNTY RIGHTS for the recently patented Springs for Chairs, Sofas, Carriages and Railroad Car Seats, which supersede the use of wire springs. Apply to or address D. H. SOUTHWICK, No. 61 Chamber st., New York. 16 2*

FOR SALE—THREE SLABBING MACHINES with cutters, which have been used in the manufacture of screw wrenches; one nearly new, and all in good order. Also, one large iron Planing Machine, three Engine Lathes, and a lot of small tools used in making wrenches. Inquire either in person or by letter of PETTIBONE & DODGE, No. 77 John st., New York, or of A. P. & E. H. PLANT, Plantsville, Conn. 16 4*

THE AMERICAN PHRENOLOGICAL JOURNAL FOR 1859—Devoted to Phrenology, Physiology, Mechanism, Education, Agriculture, the Natural Sciences and General Intelligence, is profusely illustrated with engravings, and published monthly at one dollar a year. Every family, and especially all young men and women, should have a copy. Please address FOWLER & WELLS, No. 308 Broadway, New York.
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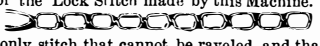

is the only stitch that cannot be raveled, and that presents the same appearance upon each side of the seam. It is made with two threads, one upon each side of the fabric, and interlocked in the center of it. Send for a circular. 6 tf*

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A MESSIEURS LES INVENTEURS—Avis Important.—Les inventeurs non familiers avec la langue Anglaise, et qui prefereraient nous communiquer leurs inventions en Francais, peuvent nous addresser dans leur langue natale. Envoyez nous un dessin et une description concise pour notre examen. Toutes communications seront recues en confidence.
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Science and Art.

Notes on the Progress of the Paddle and Screw.—No. 7.

The blades were made movable on their radial axes in the boss by Millington, in 1816.

Woodcroft (1844) effected the adjustment by a rod lying along the shaft, jointed at one end to a short arm on the blade, and carrying at the other end a stud, which takes into a groove in a short box or hollow piece, traversing the shaft on feathers.

Woodcroft, in 1851, used another form of boss, by which the blades could be so turned on their axes, while the shaft revolved, as to operate on the water with their reversed sides, and thus to back the vessel without stopping the engines.

Hays (1844) altered the blade's angular position by screwing up a ring. Bodmer (1844) placed one pair of blades loosely on the shaft, so as to be properly set as they revolved, and to rest vertically behind the false stern-post. For the like purpose, Malo (1850) put the pairs of blades on different shafts, one being hollow.

Buchanan (1846) and Maudslay (1848) made the water turn the blade on its radial axis, and fixed it by clutches. Griffiths (1853) adjusted the blades from the deck by a key working a bolt in the boss.

Wingate (1857) turned the blade by a key, and fixed it by the friction of its conical shank in the boss.

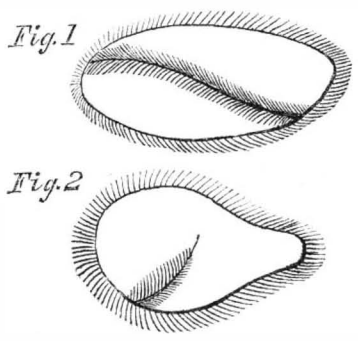
In 1849, Griffiths caused the pitch of the blades to be altered by levers, according to the speed of the shaft. Burch (1852) substituted a large plate for the boss, and the blades thus projected beyond the ordinary hull lines of the stern, which were continued aft beyond the propeller. Paterson (1857) produced a similar effect by using for the boss a large conical drum, coinciding at the foremost end with the shape of the vessel, which was terminated by a round vertical plane.

The screw-propeller was caused to steer the vessel by altering the direction of the shaft or the angular position of the blades. Shorter (1800) and Millington (1816) used the first plan, turning the shaft to one side or another by a Hooke's joint. Pumphrey (1829), Buchanan (1853), and Abadie (1854), attached the shafts to a frame moving laterally with the rudder; and Bucholz (1851) geared each of his three propellers in a ring, which allowed the axis to be directed for steering.

The second mode of steering was adopted by Woodcroft (1851), who attached each blade by an arm to a rod with a stud in the groove of a box on the shaft inside the vessel. The direction of the groove could be so altered by switches as to cause the blade to act with its broadside during one part of each revolution, and thus to impel the stern to one side or another. When the blades were stationary, in a vertical position, they might be turned on their axes, so as to act like an ordinary rudder.

Foulerton (1844) and Wimshurst (1850) placed a screw on an axis athwart the vessel, so as to steer by revolving in one or the other direction.

In the modes of propulsion adopted by aquatic animals may be found almost every plan which has been used by man with machinery. Thus water is ejected for propul- [illegible] the cuttle fish and paper nautilus; sail- [illegible] by the velella and water birds; pull- [illegible] rowing by whelks and the lepidosiren; sculling paddle by the lobster, feathering paddles by ducks, and oblique surfaces by fish of all kinds. A screw-like appendage is found in the wings of an Australian fly, but it is supposed to be shaped thus only when dried after death. There is, however, one remarkable animal which propels itself by a rotary movement, acting on the water by means very similar to those of the paddle wheel and screw propeller combined; this is the infusorial insect Paramecium. My attention was called to this miniature Leviathan by Mr. Robert Mallet, and after some months of ineffectual search, I was fortunate enough to see its operations distinctly in one of Mr. Tomkins' splendid microscopes. The form is represented in the accompanying engraving,

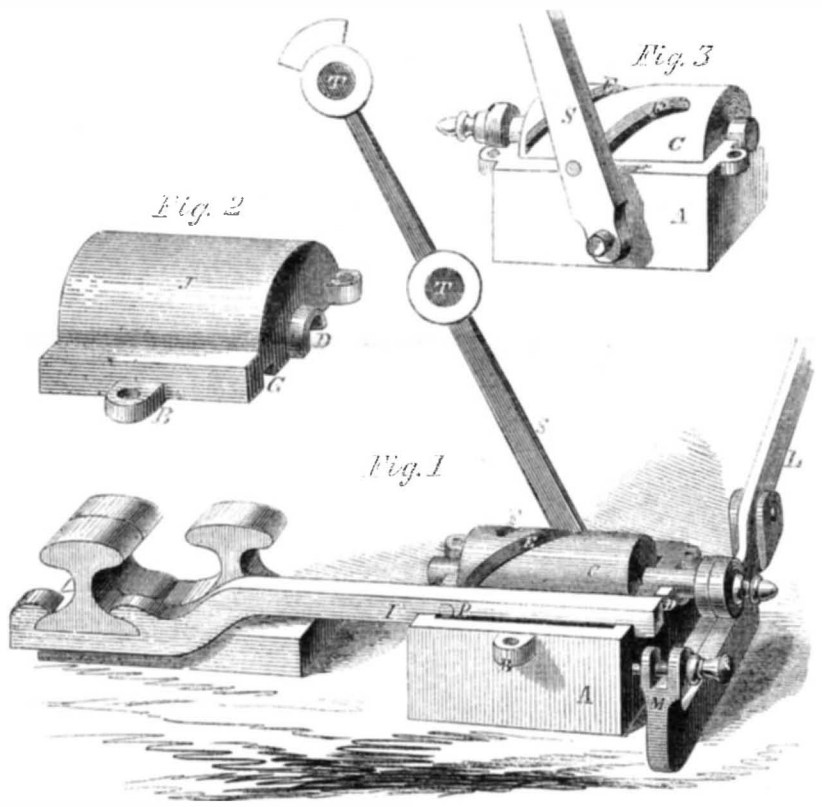


1 being the *Paramecium Caudatum*, and 2 the *Paramecium Compressum*. A sulcus or furrowed groove runs obliquely round the oval-shaped body of the animal (in one variety it is only near the stern). A wave-like protuberance passing along this sulcus (with or without cilia) causes the body to rotate on its longer axis, and thus propels it as by the fore-and-aft stroke of a paddle, as well as by the screw-like progress induced by the spiral groove. Galloway (1856) proposed to combine the paddle wheel, screw propeller, and the discharge of water.

A Technological College.

While we have many colleges in which the student is taught the theory and practice of medicine, and likewise the arguments of the schoolmen in theology, we have few in which the useful arts are taught as a profession, or a practical knowledge of our manufactures given. We want more places where men of science shall be made and prepared for the field of industry, and sent out fitted to fill the positions of managers of chemical, metallurgical or mechanical works. Such an institution, which may be taken as a model by our other States, is the Polytechnic College of the State of Pennsylvania, in Philadelphia, over whose able faculty Dr. Kennedy efficiently presides. In that institution the sciences are taught practically and with reference to their application, and as a consequence, the graduates are able to take scientific positions in any large manufactory. More of our young men should set to work and study technology, now that they can do so without going to Europe, and should take advantage of the educational resources that this college affords.

DODGE'S RAILROAD SWITCH.



This improved device for operating switch rails, either single, double, or treble, is designed for hand use; and is more particularly intended to remedy the inconvenience occasioned by the use of the ordinary timber head-blocks in crowded or confined locations. It stands on the tie or sleeper, and can be placed between the rails, the size being only 10 by 8 inches for a single switch, and no extra timbers are required. Fig. 1 is a perspective view of the whole arrangement, with the cover, Fig. 2, removed.

A is a metal box, provided with lugs, B, to which, by corresponding lugs, B, in the cover, the whole can be firmly secured together, so that no ice can accumulate about the device. In bearings, D, in the box and cover, rests the barrel or cylinder, C, also of metal. In this are two grooves, E and F; in E a pin, P, works, which projects from the side of a bar, I, to which the rails are attached, and as the cylinder is rotated or moved by the lever, L, this bar, I, is moved, bringing the single rails into connection or line with any of the other rails on which it is desired to "shunt" the train.

The groove, F, works, by a pin similar to P, the target staff, S, seen in the back view of the arrangement, Fig. 3, and inclines the targets, T, in the same direction as the rails are put. When a treble switch is required, the groove, E, only, is necessary in the cylinder, as the lug in front can be replaced by two as at the back, and the target connected to the bar, I, can be secured to the front, so that with the switch it will either stand perfectly perpendicular, or incline to the right or left. When the switch is placed very close to, or between the rails, the target can be removed to form a "muley switch," and the switch can be locked in any position by the slot and pin, M. The cylinder being reversed in its bearings, it can be made to work with the lever, L, on the side next the track.

The inventor is C. C. Dodge, of Marshall, Mich., from whom, or S. W. Dodge, of the same place, further information or switches (they being manufacturers) may be obtained. They are durable, cheap, and easy transmitters of power, and were patented October 5, 1858.

A solution of nitro-muriate of cobalt turns green when heated, which color disappears on cooling; it is on this account used as an invisible ink.

Guano Discoveries.

We learn from the New York *Tribune* that large and valuable deposits of guano have been discovered in the Pacific Ocean, and formally taken possession of by citizens of the United States. Among these islands are Malden's, Arthur's, Howland's, and Christmas; and at one of them there is said to be a land-locked harbor in a lagoon, six miles broad by twelve miles long, which is entered from a bay outside, where ships can safely anchor in seven to ten fathoms of water. Almost the entire surface of this island (more than forty miles long and fifteen broad) is reported to be covered with guano from one to ten feet deep. Especially is this so for many miles in extent around the lagoon, where hundreds of ships can lie, and thousands of boats work at once in loading them.

Sale of Express Goods.—The Dayton *Journal* tells the following good story of a "sell," such as does not occur every day, in which curiosity "ran a muck" with the desire of gain:—"The sale of express goods, not called for and forfeited, to pay charges, took place on Saturday morning. There were some amusing scenes at the sale, as it was a lottery in every sense of the word, except that the Express Company promised no prizes and offered no inducement to purchasers; the package was sold just as it was—you saw the *outside*, but the contents were a sealed book till you bought, and so gained the right to break it open. One man paid a pretty good price for a bundle of advertising almanacs; another a like sum for a fluid of a sort which could only be used on some very particular occasion; another bought a letter which he *said* contained $4, but he did not break it open in the presence of witnesses; and another gave thirty-five cents for a neat little package which, on being opened, proved to be the daguerreotype of a 'colored gal.' And so the thing ran. Many of the packages contained patent medicines; one, a baby's belt of patent leather. The sale was continued for three or four hours, and afforded 'lots of fun' to the spectators."

MECHANICS

INVENTORS, MILLWRIGHTS. FARMERS AND MANUFACTURERS.

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